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ABSTRACT

This publication seeks to help community leaders launch KickStart Initiatives to bring their communities onto the information superhighway. Part 1 outlines potential benefits of connectivity to individuals, to educational institutions, to businesses, and to communities. Factors influencing success in the connectivity endeavor include visionary leadership, ample technology and training, and access to meaningful information content. Several case studies are presented of schools, libraries, museums, community centers, and state and regional organizations whose KickStart initiatives demonstrate the value of these ingredients. In part 2, leaders are given suggestions on how to galvanize stakeholders, identify costs and funding sources, and promote awareness of user responsibility. Part 3 is a primer on intellectual property and copyright. Print and online resources are listed in part 4, along with sample acceptable use policies. (BEW)

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# KICKSTART INITIATIVE

## Connecting America's Communities to the Information Superhighway

National Telecommunications and Information Administration
United States Department of Commerce

Washington, D.C.

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# TOP TEN QUESTIONS ABOUT THE KICKSTART INITIATIVE

This publication is intended to help community leaders launch KickStart Initiatives to bring their communities onto the Information Superhighway. Communities will want to answer these ten questions when developing their program:

1. What's the Information Superhighway all about?
   (See "Defining the Information Superhighway," pg. 7)

2. How will communities benefit from the Superhighway?
   (See Section 1, Part 1, "Realizing the Benefits," pg. 11)

3. What is a KickStart Initiative?
   (See "A Call to Action," pg. 5)

4. How can communities start a KickStart Initiative?
   (See "The Key Messages of KickStart," pg. 7)

5. How do communities ensure success in their KickStart initiatives?
   (See Section 1, Part 2, "Highlighting the Ingredients of Success," pg. 25)

6. How have other communities succeeded in joining the Superhighway?
   (See Section 1, Part 3, "Showcasing Success Stories," pg. 33)

7. Who can kickstart a community?
   (See Section 2, Part 1, "Galvanizing the Stakeholders," pg. 81)

8. What will it cost and where will the money come from?
   (See Section 2, Part 2, "Identifying Costs and Sources of Funding," pg. 89)

9. What are the "rules of the road" for participating in the Information Superhighway?
   (See Section 2, Part 3, "Meeting Responsibilities as Users and Creators," pg. 107)

10. Where can somebody get more information?
    (See Section 4, "Resources for Communities," pg. 141)

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# KickStart Initiative

## CONNECTING AMERICA'S COMMUNITIES TO THE INFORMATION SUPERHIGHWAY

**United States Advisory Council on the National Information Infrastructure**

Through Executive Order No. 12864, President Clinton established the United States Advisory Council on the National Information Infrastructure (NII) to advise the Secretary of Commerce, Ronald H. Brown, on matters related to the development of the NII. Secretary Brown appointed 37 Council members, representing the many different stakeholders in the NII, including industry, labor, academia, public interest groups, and state and local governments.

The National Telecommunications and Information Administration (NTIA) of the Department of Commerce provided support for the Advisory Council and is providing a second printing of the two primary Council publications:

*KickStart Initiative: Connecting America's Communities to the Information Superhighway;*

and

*A Nation of Opportunity: Realizing the Promise of the Information Superhighway.*

The Benton Foundation will continue the Council's work to bring the Information Superhighway to schools, libraries, and community centers. As heir to the Council's legacy, Benton will distribute and build on the NIIAC's documents, *KickStart Initiative* and *A Nation of Opportunity*. In addition to promoting these resources, Benton will create new information services and forums to help schools, libraries, and community centers share their successes and challenges.

The Benton Foundation, founded in 1981, works with nonprofit organizations, government agencies, and industry to promote the effective use of communications technologies to serve and connect America's communities. Benton has equipped a constituency to advocate for public interest principles in the digital age, advancing the public policy debate on equity and access through research, policy analysis, and print, video, and online publishing. In addition, Benton serves as a convener for nonprofits, government agencies, and the communications industry to discuss how to protect the public interest in the digital age.

To access *KickStart Initiative* and *A Nation of Opportunity* on the Internet, use Benton's World Wide Web site: **http://www.benton.org**. To receive descriptions of *KickStart Initiative, A Nation of Opportunity,* and *The National Information Infrastructure and You!* video, information on other Benton resources, or instructions on downloading the documents via gopher or ftp, email **kickstart@benton.org** or call Benton's fax-on-demand service at 1-800-622-9013.

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# A Call to Action

This Nation stands on the threshold of one of the greatest opportunities in its history, the opportunity to seize the boundless benefits of the Information Age for its people. America must act now—within the few years remaining before the next millennium—to link everybody in every community to the Information Superhighway.

Therefore, the National Information Infrastructure Advisory Council (NIIAC) calls on community leaders across the Nation to move rapidly to provide all individuals the opportunity to access and use to the Information Superhighway. Equality of opportunity is a fundamental tenet of American democracy. Every individual in this country should have the opportunity to participate on the Information Superhighway by the year 2000. The quickest, most efficient way to do this is to bring the Superhighway to the neighborhood—to schools, libraries, and community centers.

The Council calls on leaders and individuals in all communities of America to pick up the challenge, to seize the opportunity, and to move rapidly and responsibly forward to use, access, and operate the Information Superhighway. Leadership at *every* level, particularly at the community level, is what will ensure that the Nation meets the goal. The Council offers this guide to help community leaders launch KickStart Initiatives to connect schools, libraries, and community centers to the Superhighway.

Vice President Al Gore foresees a Nation with a Superhighway that "can save lives, create jobs, and give every American, young and old, the chance for the best education available to anyone, anywhere." The Council shares that vision. The Council wants to see that vision become a reality in the next 5 to 10 years, and it believes that hundreds of community programs, all over the Nation, will help to make that a reality.

Imagine a Nation where every student in every classroom visits libraries and museums of the world electronically, where families and friends widely separated by distance converse easily and inexpensively via electronic mail, where every library is a local information hub, and where community centers help local residents learn, use, and benefit from new communications technologies.

That America can become a reality in just a few years. Every person in the country will benefit. Community leaders and the public face an historic opportunity. The time to act is now.

**"This is an enormous effort. It will take the same spirit and tenacity that built our railroads and highways. It will take leadership and dedication of groups like the NIIAC . . . So let us begin. Let today mark the start of our mission to connect every school in America by the year 2000."**

*—President Clinton, Sept. 21, 1995, remarks on education technology and connecting classrooms, San Francisco, California.*

# The Key Messages of KickStart

If everybody in America has access to the Information Superhighway, a more vibrant society and a more robust economy will result. Every community in America will benefit from being linked to the Information Superhighway. Participation and use will:

- Improve the lives of individuals;
- Reinvigorate education;
- Expand businesses; and
- Strengthen communities.

Many communities are already joining the Superhighway. Their stories are told in this publication. Others are just beginning to identify leadership, to plan, and to find funding sources. This publication is a guide for leaders and the public in all those communities.

## KEY MESSAGES

After 2 years of study and talks with many people across the country in all walks of life, the Council concludes that the best approach for this Nation is to bring the Information Superhighway to the neighborhood. That is most rapidly accomplished through connecting schools, libraries, and community centers where everybody—young and old, rich and poor, those with and without disabilities—can obtain affordable access to the Superhighway.

But each community needs to develop its own approach. There is not a "one-size-fits-all-communities" approach—instead, the key players from each community should come together to determine how that community's interests can best be served through connection to the Information Superhighway.

As your community proceeds, the Council believes that the following key messages contained in this KickStart publication may serve to be the most useful:

1. The Information Superhighway should be designed to enhance lifelong learning, job skills, and community building.
2. Training teachers, librarians, and community service providers is critical—the country is now very far from having every teacher or librarian ready to train and help others to use the Superhighway for learning and skill building.
3. Software and other kinds of creative content are critical to providing the real benefits of the Superhighway.
4. Everyone can be both a consumer and creator of intellectual property. The rights of creators and owners of intellectual property must be observed and respected.
5. Costs are manageable and sources of funds are available to the committed and persistent.

### *Defining the Information Superhighway:*

A series of components, including the collection of public and private high-speed, interactive, narrow and broadband networks that exist today and will emerge tomorrow.

- It is the satellite, terrestrial, and wireless technologies that deliver content to homes, businesses, and other public and private institutions.
- It is the information and content that flow over the infrastructure, whether in the form of databases, the written word, a film, a piece of music, a sound recording, a picture, or computer software.
- It is the computers, televisions, telephones, radios, and other products that people will employ to access the infrastructure.
- It is the people who will provide, manage, and generate new information, and those who will help others to do the same.
- And it is the individual Americans who will use and benefit from the Information Superhighway.

The Information Superhighway is a term that encompasses all these components and captures the vision of a nationwide, invisible, seamless, dynamic web of transmission mechanisms, information, appliances, content, and people.—*Common Ground.*

6. There are many diverse and varied stakeholders in every community who can and should be counted on to be part of KickStart Initiatives.
7. A large body of useful information, both in print and online, can serve as a good starting point for KickStart Initiatives.

But if there were one overriding lesson that we take away from the success stories that we've witnessed and learned about it's that one person can make a real difference. Whether it's been a student, one parent, one teacher, or one community leader, our experience is that a "champion" for the Information Superhighway has been the critical success factor. We hope this volume will serve as a guide and a resource—but you should know that your vision and your energy are likely to be the critical difference in bringing your school, library, or community center into the 21st century.

# section1

## CONNECTING PEOPLE AND COMMUNITIES TO THE INFORMATION SUPERHIGHWAY

# part1
# Realizing the Benefits

The promise is yet to be met, but unlike the latest whiz-bang toy, hot new sports car, or bell-bottom pants, the Information Superhighway is not a fad. It's here to stay. To be sure, over the years there will be pot holes that need to be filled, bridges to be replaced, new roads, and vehicle destinations we can't imagine today, but the Superhighway and the information that flows within its confines will only get better with age. And in what will seem like the wink of an eye, just like the telephone, the automobile, the airplane, the clothes dryer, and the microwave oven, people will wonder how they got along without it.

In fact, in 1995, 27 million U.S. workers were using e-mail in the workplace, just under a sixth of U.S. homes had at least one computer connected to a modem, and more than 12 million Americans were using the Internet each day.[1]

Most people are using some aspect of the Superhighway whether they know it or not. Regardless of how remarkable the current uses may be, they are only the tip of the iceberg.

The technology and the information it carries is the new vehicle for social and economic activity. The Information Superhighway will affect and improve the lives of individuals of all ages, as well as the Nation's educational system, business environment, and the very fabric of community life. It has already started, in many places.

## ENHANCING AND IMPROVING THE LIVES OF INDIVIDUALS

The Superhighway is helping bring people and communities together. A 1995 CommerceNet/Nielsen study estimated that 37 million people have access to the Internet. Americans are sending messages to more than 60,000 bulletin boards every day.[2] Parents are trading electronic messages with their own parents and grown children who have left the nest to begin adult lives or college careers. Friends are finding it easier to keep up longstanding relationships because they can send a message nearly instantaneously, without worrying about time zone differences or whether someone will be home to pick up the phone. And, people of all ages are widening their circle of friends by making new friends—Cyberpals, you might say—online. For many people, going online and checking for e-mail has become a highlight of the day—just like going to the mailbox was in years past.

### Obtaining Job Skills for a Changing Economy

As the 21st century approaches, a well-developed mind, knowing how to learn, and the ability to put knowledge to work will increasingly determine success in the workplace; fully 60 percent of jobs in 2000 will require a working knowledge of information technologies. Young people who leave school without the knowledge and foundation required to find and hold a good job will pay a high price—throughout their working lives.

### When Seniors Go Online

According to the American Association of Retired Persons, the largest organization of senior citizens in the Nation, 2 million of its 33 million members are computer users. For these seniors, computers are not just a way to learn or earn, they are a way to get back into life, make new friends, keep up with their families, and recreate. Seniors are doing everything from monitoring investments, tracking genealogy, producing memoirs, starting postretirement businesses, and chatting online. Take the story of Rick and Rita Hanson.

In 1993, Rick Hanson, a former truck mechanic, and his wife Rita sold their home in Bellingham, Massachusetts, purchased a 28-foot-long mobile home and set out on a nationwide tour. The two felt comfortable making this lifestyle change because of SeniorNet, the San Francisco-based network designed to introduce those over 55, those not "raised with computers," to the joy of being online. Says Rick, "We wouldn't have considered this trip if it weren't for SeniorNet . . . If one of us got ill what would the other do? But no matter where we are in the U.S., we're within 100 miles of friends." This traveling couple has gone from Thanksgiving in Las Vegas with 60 online friends to a wedding of 2 SeniorNetters in Michigan. "Lord willing," says Rick, "we'll see all 350 people in our computer family."—*John F. Dickerson,* Time Magazine, Special Issue: Welcome to Cyberspace, *"Never Too Old." Spring 1995, p. 41.*

Four years ago, the Secretary's Commission on Achieving Necessary Skills met with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores to determine what the demands of this Nation's workplaces would be in the next decade and whether young people are being properly prepared to meet those demands.[3] The Commission reported that, in addition to technical knowledge, to succeed in the workplace of the 21st century every American will need to know how to:[4]

- Identify, organize, plan, and allocate resources;
- Work with others;
- Acquire and use information;
- Understand complex interrelationships among social, organizational, and technological systems; and
- Work with a variety of technologies.

The foundation for these competencies is built on three types of skills:

- The ability to read, write, perform arithmetic and mathematical operations, listen, and speak;
- The ability to think creatively, make decisions, solve problems, visualize, learn outside of the classroom environment, and reason; and
- Personal qualities, including responsibility, self-esteem, sociability, self-management, and integrity and honesty.

Whether in the classroom, in a library, in a community center, or at home, every American who goes online is acquiring many of these skills—often without ever knowing it.

## Gaining New Opportunities for Lifelong Learning

Recent research has shown that people who read, take up new hobbies, and find other ways to stimulate thought processes—that is, engage in lifelong learning—are happier, more productive, and have better mental health. Those who engage in the lifelong learning process will find themselves empowered to be creative and to capitalize on unexpected opportunities—their professional skills will continue to be updated; they will find new avenues for fun and entertainment for the family; they will find it easier to keep up on local and national issues; and they may take full advantage of new, easily accessible commercial and government services.

The Information Superhighway promotes lifelong learning because it promotes collaborative learning; can provide access to online digital resources; provides new opportunities to gather data for, as well as create and disseminate, video, writing, and music projects; and can take people to places to see things that they could only have read about before—through "virtual" field trips to museums and science exhibits—without leaving their homes, schools, workplaces, or communities.

## Improving Job Skills, Career Advancement, Employment Opportunities, and Professional Development

It used to be that hunting for a job consisted of networking and hunting through the employment section of the newspaper or the career opportunities sections of job-specific periodicals. Today, in many communities, employers are also posting job openings on the World Wide Web. For employers, using the Information Superhighway to advertise openings has three advantages: they can reach a nationwide audience; they can be assured that prospective employees are conversant with Information Age technologies (after all, a person has to know how to travel on the Information Superhighway to find the job offering); and job offerings can be posted at any time, for however long it takes to find the right employee, at very low cost. In California's Silicon Valley these days, the best jobs are now posted on the World Wide Web. Furthermore, in Sacramento, California's State capital, job hunting accounts for the bulk of uses of the main library's online facilities.

For many individuals, gaining the new skills required for career advancement and professional development often meant time away from work and family to travel to a distant location and attend a professional training seminar or conference. Because of the costs associated with travel, housing, and conference fees, in these times of tight budgets, the combination of costs and lost time on the job have caused many employers to limit or eliminate employee professional development opportunities. The Information Superhighway provides cost-effective opportunities for distance learning, and, thereby, new opportunities for career advancement and professional development.

For instance, nurses in North Carolina have attended training sessions given at a conference in Atlanta, Georgia, without ever leaving their own hospital. The hospital does not have to pay travel or housing costs, and time away from the job is minimal. As a result, more nurses are being trained at a lower cost.

## Improving Participation in the Democratic Process

Computers and communications technologies have brought Federal, State, and local government to the fingertips of any person who knows how to fax, send e-mail, or retrieve information off the World Wide Web. Anyone, anywhere can read the press releases that emanate from 1600 Pennsylvania Avenue, and the speeches made by the President and placed on the White House Web site. Anyone can learn what State and local politicians are saying and doing. What's more, the average American can tell the President, State and local officials, and government agencies at all levels what they think about what they're doing, how they're voting, and issues they should be addressing.

The Information Superhighway is also having significant effects on the operations of municipal government and the conduct of public life at the local community level. For example:[5]

- **Community access networks.** The Information Superhighway is expanding opportunities for individuals to participate in local political activities through grassroots networks that provide citizens and taxpayers with a wide range of information services. These information services give citizens more of an opportunity to participate in all forms of government, regardless of geographic or other limitations—physical disabilities, for instance.

- **Government that works better and costs less.** All levels of government are using the Information Superhighway. The Federal Government, for instance, uses it to disseminate economic and trade information, permit electronic downloading and filing of tax returns, and provide information on how to apply for education and science research grants.

The Information Superhighway thus gives every person living in this country a new voice in the democratic process, as well as rapid access to information produced, for their benefit, with their tax dollars.

### *Getting Out the Vote*

A bipartisan coalition of 110 women's groups has launched an effort to get more women to vote—and it is using the Information Superhighway to spread the word.

Employing a World Wide Web site and a fax network, the Women's Vote '96 coalition hopes to convince the Nation's 99 million voting-age women (1994 census figure) to exercise their right to vote. Almost 38 percent voted in the 1994 elections, about the same percentage as men.—*"Women's Groups Push High-Tech Outreach,"* The Washington Post, *Sun., Nov. 5, 1995, p. A12.*

## Enhancing Cultural and Creative Opportunities

Not everyone can visit the famous museums of the world or Carnegie Hall, but they can be exposed to a variety of works of fiction and nonfiction, music, video, and art on the Internet. In addition, they can express their own creative talents and make their works available for others to enjoy. This is one of the most exciting and personally rewarding aspects of the Superhighway, and people are making use of this aspect of the Internet in droves. Senior citizens, for instance, are writing about their life experiences. Students are putting together multimedia presentations on subjects such as Lady Macbeth. The Navajo tribe is preserving its language, stories, and culture for future generations using the Information Superhighway.

For many in the United States, particularly those who live in isolated rural areas, the Superhighway is providing a first glimpse of many aspects of culture and creativity that the world has to offer. It is expanding horizons, and particularly for young people, providing an opportunity to develop parts of themselves that might not otherwise be reached.

"I am totally blind; with two glass eyes. I have been blind all of my life, and have never known anything different. I have been mainstreamed in schools all my life, and have always had to depend on others to get me school materials. . . . Getting Internet access was the best thing that ever happened to me. In a way, my computer and access to the Net have become my eyes to the world. I can read a newspaper, talk to people around the world, and get materials for class papers, unlike before when I had to depend on others to get the resources I needed."—*Randy Hammer*

## Improving Access and Communications for Individuals with Disabilities

Between 40 million and 50 million children and adults living in this Nation have disabilities. Some use wheelchairs or have limitations in using their arms or hands. Some have vision or hearing impairments; others have difficulty speaking, and still others live with combinations of limitations, some physical, due to conditions such as arthritis or diabetes, and some mental and cognitive, due to strokes, mental retardation, or other conditions. With adaptations to the environment or through the use of technology, most can be actively involved in school, work, recreation, and civic life.

People with disabilities experience barriers to many facets of life. The United States has attempted to eliminate or reduce these barriers by enhancing the opportunities for public education for disabled children, modifying the environment through accessibility standards in building codes, creating new opportunities through legislation such as the Americans with Disabilities Act, and providing public education campaigns to change stereotyped and negative attitudes.

The Information Superhighway can be a major boost to open up opportunities and remove barriers for persons with disabilities. Because geographic location is much less relevant with information technology, people who have difficulty with transportation or physical endurance can opt to receive information about their bank account balance, or participate in adult education programs, for example, from their own homes.

Right now, a wide variety of existing adaptive equipment is enabling people of all ages with disabilities to use information technology for participating in many aspects of life that most people take for granted. New advances in the design of technology that incorporate these accessibility features into off-the-shelf equipment for generic use will make information technology much more affordable and useful for persons with most kinds of disabilities.

## Improving and Reducing Costs of Health Care

Many observers believe that the Information Superhighway will bring substantial savings to the health care industry while continuing to extend the quality and availability of health care. Some experts estimate that telecommunications applications could reduce health care costs by $36 billion to $100 billion each year while improving quality and increasing access.

Some existing and potential applications of the Information Superhighway in the health care field include:[6]

- **Telemedicine.** The Superhighway allows health care providers to consult with specialists thousands of miles away, upgrade their education and skills, and share medical records and X-rays under appropriate procedures. For instance, doctors at the Mayo Clinic have provided expert help to patients and local doctors at the Pine Ridge Indian Reservation in South Dakota.
- **Personal health information systems.** Today, most people lack the tools they need to become active and informed participants in their own health maintenance: 50 to 80 percent enter the health care system unnecessarily; many go to emergency rooms when what they need is a consultation with a family doctor; and many with serious health problems enter the system too late. The Information Superhighway can and is being used to promote self-care and prevention in a way that is accessible to and helps individuals. For example, one shopping center in California has a public access site where anyone who wants to can tap into health information: a research assistant is available to help users get the appropriate information. Communications and Computer Applications in Public Health estimates that if personal health information were used just 25 to 35 percent of the time, savings on medical care would be $40 billion to $60 billion per year.

### *Computers Bring History Alive for Vocational Students*

It wasn't long ago that a number of students at the Medina County Career Center were seen with their heads down during their social studies class. Today, these same students are bright and alert and spending extra time in the classroom, lured by a modern social studies lab.

The idea for this classroom came from history and government teacher Jackie Smith. She researched computer systems, software, and laser disks, and then received a grant to turn her vision into a reality.

Today, approximately 200 students use the lab for history and government classes. One student recently took a tour of the Capitol, walking down halls and learning about paintings on the walls with CD Capitol Hill. Other students are learning about various facets of World War I—weaponry, world leaders, and causes of the conflict—through another program. And students who had previously balked at learning are often skipping lunch just to stay and work in the lab.

- **Computer-based patient records.** Computer-based patient records are critical to improving the quality and reducing the costs of health care, according to the Institute of Medicine. Today, 11 percent of laboratory tests must be reordered because of lost results; 30 percent of the time treatments ordered by a physician are not documented; 40 percent of the time a diagnosis is not recorded; and 30 percent of the time a medical record is completely unavailable during a patient visit. Use of computerized patient records shows real promise for improving records and record tracking.

## REINVIGORATING AND IMPROVING EDUCATION

American children are capable of learning at substantially higher levels—many at levels previously expected only from those pinpointed by the education system as especially gifted or talented. Evidence of this has come from research in cognitive science, educational achievements of other countries, and pioneering efforts in American schools. After 35 years of research, it is clear that the children educated in this country can learn more, faster, and that technology can be the key to higher levels of achievement.[7]

When computer technologies and the vast resources of the Information Superhighway are introduced into academic settings, children get excited. They dig in and begin to locate information, and in the process they learn—not by memorizing or regurgitating, but by doing. They become archaeologists unearthing hidden treasures of times gone by and trying to figure out how past civilizations lived. They learn about the environment by collecting data and comparing their findings with others online. They improve writing skills by asking questions and expressing their views to others—both subject experts and peers looking for answers. They consume what the Information Superhighway has to offer, but they frequently add to its resources with their own creative efforts, making additional resources available for others to use or simply enjoy.

It takes only a few minutes in a classroom to realize that students quickly become engrossed in the Information Superhighway. Aside from their enjoyment, however, the benefits of using the Superhighway are both real and documented with both quantitative and anecdotal evidence. Networking technology is a powerful tool to help improve education and the learning process. Use of the Information Superhighway:

- **Brings the world to the classroom**. No matter what their socioeconomic or ethnic background, and no matter where they live, the learning field for all students can be leveled. Students are introduced to people, places, and ideas they might otherwise not be exposed to;
- **Enables students to learn by doing.** Research has now confirmed what many instinctively knew—that children who are actively engaged in learning, learn more. The effects are particularly noticeable among students who were not high achievers under more traditional methods. Networked projects, where students work with others and conduct their own research and analysis, can transform students into committed and exhilarated learners;

- **Encourages students and parents with limited or no English skills** to learn English, in order to expand their economic opportunities;
- **Makes parents partners in their children's education** by connecting the school with homes, libraries, or other access ports;
- **Makes it possible for educators to teach at more than one location simultaneously.** Vastly expands opportunities for students in small, remote areas to take courses on subjects that, for economic reasons, are generally available only to students in more affluent, populated, urban and suburban areas;
- **Enables educators to accommodate the varied learning styles and pace of learning within the classroom.** This individualized instruction can be a key factor in student achievement;
- **Encourages students to become lifelong learners** who can access, analyze, and synthesize information;
- **Allows educators to become guides and coaches to students**, rather than be "the sage on the stage";
- **Enables administrators and educators to reduce time spent on administration and recordkeeping,** so they can spend more time with students; and
- **Makes students proficient in the basic technological skills needed to take their place in society**, whether they enter the working world directly after high school or pursue further formal education.

In the past few years, research data demonstrated these benefits, plus substantial, additional real achievement benefits such as:

- A 1995 review of more than 130 recent academic studies found that *using technology to support instruction improved student outcomes in language arts, math, social studies, and science.*[8]
- A review of computer-based instruction in military training found that students reached *similar levels of achievement in 30 percent less time* than needed to achieve the same level of competency using more standard approaches to training.[9]
- A congressionally mandated review of 47 comparisons of multimedia instruction with more conventional approaches to instruction *found time savings of 30 percent, improved achievement and cost savings of 30 to 40 percent, and a direct positive link between the amount of interactivity provided and instructional effectiveness.*[10]
- A review of New York City's Computer Pilot Program, which focused on remedial and low-achieving students, showed *gains of 80 percent for reading and 90 percent for math when computers were used to assist in the learning process.*[11]
- A comparison of peer tutoring, adult tutoring, reducing class size, increasing the length of the school day, and *computer-based instruction found computer-based instruction to be the least expensive instructional approach for raising mathematics scores by a given amount.*[12]

## Preparing Young People for Lifelong Learning

An example of how to prepare young people for lifelong learning that will help them to succeed and prosper in the Information Age comes from the National Urban League. Under the leadership of its new president, Hugh Price, this venerable civil rights organization is launching a major effort to prepare America's black children, both academically and socially, for the 21st century.

The Information Superhighway plays an important role in the League's strategy. "We plan to work with parents to show them what their children must know and be able to do in order to succeed in the technological age," Price says. "Then we'll translate those skill standards into benchmarks so parents will know if their kids are on course." The League has received a grant from The Pew Charitable Trusts to determine what those benchmarks might be and how parents can use them to measure their children's progress.

The League intends to package its benchmarks and make them available nationwide "to every interested parent," Price says, through its 114 affiliates, PTAs, religious institutions, and other outlets. "That's in addition to other parent-education efforts," Price adds. "The goal is to help parents become sophisticated and insistent consumers as regards their children's education."—*William Raspberry, "Hugh Price's Children's Crusade,"* The Washington Post, *Sept. 25, 1995, p. A21.*

## Businesses and Individuals Benefit from Telecommuting

When commuters replace daily trips over concrete highways with trips on the Information Superhighway, their productivity increases, they are more motivated, and they change jobs less frequently. In addition, employer costs for retraining, office and parking space, and energy decrease. And there are benefits to society as a whole—roads are less congested, and fewer cars mean less pollution.

Time and again studies on telecommuting have evidenced these benefits. For example, a study of more than 400 telecommuters in Los Angeles, conducted over an 18-month period, found that telecommuter productivity increased an average of 12.5 percent, or $6,100 per telecommuter, when compared with the productivity of comparable nontelecommuters. When other benefits were quantified, employers saved: an additional $2,400 per year for each telecommuter; 4,000 kilowatts in energy per year, as a result of reduced fuel consumption; and 30 percent in office and parking space. Additionally, 18 percent of telecommuters reported that the ability to telecommute was a moderate to decisive influence on their decision to stay with the city. As a final point, this study showed that telecommuting afforded mobility-handicapped persons new employment opportunities.

- A 1993 survey of studies of the effectiveness of technology found that "courses for which computer-based networks were used *increased student-student and student-teacher interaction, increased student-teacher interaction with lower-performing students,* and did not decrease the traditional forms of communications used."[13]
- Research on the costs of instruction delivered via distance learning, videotape, teleconferencing, and computer software indicates that *savings are often achieved with no loss of effectiveness.* Distance learning vastly broadens the learning environment, often providing teaching resources simply not available before. Technology-based methods have a positive impact on learner motivation and frequently save instructional time. Savings in training time produce benefits both by reducing training costs and by shortening the time required to become and remain productive in the workplace.
- A landmark study on the use of technology for children with disabilities showed that *"almost three-quarters of school-age children were able to remain in a classroom, and 45 percent were able to reduce school-related services"* when computer-assisted learning techniques were employed.[14]

These data are only the tip of the iceberg. New studies heralding the benefits of Information Age technologies and the Information Superhighway for improving education are now reported almost on a daily basis. The stories, although beginning to have a familiar ring, also sometimes have some interesting twists. For example, the Advisory Council found specific benefits in these success stories (see Part 3 for full descriptions of these stories):

- In Union City, New Jersey, operation of the Christopher Columbus Middle School was about to be taken over by the State because students were performing at unacceptable levels—virtually across the board. A few years after the deployment of networked computers, student achievement levels rose to above average in reading, language, the arts, and math;
- In California, students at Chula Vista's Clear View Elementary School went from being in the bottom 10 percent on standardized achievement tests to the 80th percentile, just 2-1/2 years after advanced technologies were implemented in the classrooms;
- In Georgia, when computers were introduced to the Carrollton City School District, dropout rates fell from 28 percent to 5 percent, and yearly savings in operating costs reached $1 million per year; and
- In the State of Washington, many students who were in danger of dropping out have come alive and have become experts in computers, networking technologies, and the Information Superhighway.

What the Council has learned in the past 2 years is that the education benefits of the Information Superhighway are numerous, and varied. Best results come when teachers have a clear understanding of how to use information technologies for specific educational goals, and can creatively employ those resources in their classrooms. The good news is that, with some time and effort, and the appropriate technologies and resources, any teacher can become an effective user of this exciting technology. In many schools, in fact, students and teachers are teaching each other about the Superhighway.

## IMPROVING AND EXPANDING BUSINESS OPPORTUNITIES

At the Ford Motor Company, leading-edge interactive technology is transforming the way engineers design automobiles. Today, engineers in England, Germany, Italy, Japan, Australia, and several different locations in the United States are linked over a high-speed network that allows them to transfer complex images and three-dimensional models. Throughout the automotive design process, styling, design verification, ergonomic studies, air flow analysis, crash simulation, digital mockups, and general group engineering reviews can all be accomplished in real-time across the network. The technology enables Ford to build highly realistic and interactive digital models of vehicles, in real-time, rather than resorting to the traditional design methodology of creating expensive physical prototypes. The result: significant cost reductions and productivity improvements that enable higher-quality cars to be brought to the market faster.

While Ford is reaping the benefits of the Information Superhighway on a global level, numerous small businesses are also growing and expanding as a result of computers and connectivity. The Peoples Flower Shop in Alexandria, Virginia, is a case in point. This small, family-owned, minority business was started in 1948 and has operated successfully ever since. During the recession of the past few years, however, business was slowing. The children of the black woman who owns and operates the shop convinced her to participate in services that take advantage of telecommunication technologies, including, 1-800-Flowers, AFS, Teleflora, and Karick. The result: a 50-percent-plus boost in business. Today, the owner says, "I have more employees and more expenses, but a lot more orders, too. In fact, sometimes I get so many wire orders during the holidays that I have to pass them to others or shut down the machine because I can't get enough flowers."

The Information Superhighway affords businesses of all sizes and types new opportunities to compete and grow both within this country and in the global economy. Using the Information Superhighway:

- **Creates new markets**—reaching potential customers, worldwide, is easier and cheaper;
- **Eases entry into new markets**, especially geographically remote markets, because it makes the playing field more level between companies of different sizes and in different locations;
- **Provides new opportunities** to undertake national programs such as health care, where the costs of personnel needed to manage a manual or disjointed automated system might be prohibitive;
- **Reduces costs to buyers** because of increased competition in procurement—more suppliers are able to compete in an electronically open marketplace;

### *Coupons and the Superhighway—the Winning Combination for a Business*

CPI, a St. Louis, Missouri-based 1-hour photo processor, owns and operates 600 photo retail outlets in malls nationwide, as well as 1,000 Sears Portrait Studios in Canada and the United States. With $500 million in annual sales, it is the largest business of its kind in the United States. Throughout its history, discount coupons—often found in the weekly television viewing guides of Sunday newspapers—have been one of CPI's most successful promotional tools. When recent market research showed that CPI customers were generally computer-literate and likely to have access to the Internet, corporate marketing executives had an idea. Why not offer downloadable coupons on the World Wide Web?

First offered through the homepage of Val-Pack Direct Marketing Systems Inc.—a company whose traditional business is mailing packaged coupons to consumers—and then through its own Web site, the downloadable coupon program has been a boon to business. Says Jim Moeller, CPI's creative director of advertising, "We wouldn't offer this premium unless we thought it would increase sales."

Coupons can be read and printed by any computer user with access to the Internet, and redeemed at any CPI/ Fox Photo retail outlet. The Web site also includes a locator map to help potential customers find the CPI outlet closest to them.—*Phillips Business Information Oct. 27, 1995.* Interactive Marketing News *2:22.*

### *Girl Scouts Go Online to Keep a Tradition Alive*

The four members of Troop 732 grew up together. They worked on their cooking badges, sold cookies, and went on camping trips as they rose from junior to cadet to senior Girl Scouts. After 8 years of afterschool meetings and activities, however, their troop was just about to disband: the troop leader, one of the girl's mothers, no longer had time to run the meetings. The girls solved the problem using the Information Superhighway.

While working as a junior counselor at Girl Scout Camp, one of the troop members mentioned that Troop 732 no longer had a leader. Two college students volunteered to fill the job, but there was a hitch. The students live in Michigan. The scouts live in California. Troop 732 became Internet Troop No. 1 and scouting over the Superhighway was born.

Today the girls of Internet Troop No. 1 are working on getting their "computing" patch, using the computer lab at Mira Costa High School, Manhattan Beach, California, as their troop meeting site. Their next goal is to earn a patch in "communications."

Girl Scouts of the U.S.A. has given its full blessing to this concept. It already has plans to make the Internet an important part of its scouting program. In fact, the organization already has a World Wide Web site under construction to provide the 3.4 million scouts worldwide with event information and foster communications among the troops.—*Tracy Johnson*, Los Angeles Times. *October 16, 1995, Metro. "Girl Scouts Go Online to Save Troop."*

- **Reduces costs to suppliers**—when suppliers can access, respond to, and receive orders online, their costs decline;
- **Reduces the time needed to complete business transactions,** particularly the time from product delivery to payment;
- **Speeds the time to market**—linking business processes virtually eliminates time delays between steps and subprocess engineering, which results in seemingly seamless processing;
- **Optimizes use of human resources**—employees are freed from many routine activities, giving them more time to focus on customer service and other duties;
- **Reduces inventory requirements**—as demands for goods and services are electronically linked through just-in-time inventory and integrated manufacturing techniques, the need to stock inventory that might become obsolete declines;
- **Reduces errors, time, and overhead costs** in information processing—requirements for reentering data are eliminated;
- **Improves the quality of goods** as a result of standardization of specifications and increased competition; and
- **Increases the variety of available goods** as a result of expanded markets and the ability to market customized products.

Every corporate giant in America started out small and grew its way into the international arena. In the past, those companies have had to develop communications networks. As the Information Superhighway grows and develops new capacities, it will provide virtually limitless opportunities for businesses to reach the global marketplace to sell their products and services and obtain the people and other resources they need to grow, themselves. Employing the Superhighway to their advantage will certainly give businesses a running start into the Information Age.

## REBUILDING AND STRENGTHENING COMMUNITIES

For many, the most promising and exciting dimension of the Information Superhighway is its ability to strengthen existing communities and to create new ones among like-minded people. This capability may, indeed, generate the most lasting effects of the Information Age.

Examples abound of how interconnected networks strengthen existing communities. Members of an extended family can communicate with each other by e-mail, swap family videos over the wire, or hold a mini-family reunion after a Saturday football game on television. Neighbors can leave detailed messages for each other when leaving town for a few days. The elderly can link up with each other to enjoy games or online chats, and sick or infirm individuals can check with local health clinics for information of importance to them and communicate with one another. Young people can form a club to exchange information and ideas, plan outings, and conduct meetings online.

Beyond those personal uses, citizens can, or will be able to, dial up City Hall and find out about the expenditures of their tax dollars on particular projects. They can register to vote, make their views known to elected officials, and obtain licenses and permits online. Consumers can order goods and services from local supermarkets or small businesses, check on local job opportunities, or find out about evening courses at the local community center.

A civic club event chair can now place one call to the telephone carrier, which can automatically relay the message to hundreds of club members in the town or city within a few minutes. The ease, speed, and low cost of the effort encourages club officers to communicate far more frequently with their members, resulting in a more tight-knit group. They can obtain information from libraries and other cultural institutions to enable them to continue learning.

These kinds of activities break through the isolation of contemporary life, when neighbor may not be acquainted with neighbor. Networks can put people in direct contact with other people in personal, civic, and commercial relationships. The key point here is that people will become *active* participants in using the networks, and will be able to interact with many different and often distant people.

Another kind of networked community consists of physically dispersed elements within a common geographical area. An example is the 200 U.S. affiliated territories and small island nations in the Pacific Ocean. Today, PEACESAT public service satellite transmissions carry noncommercial, educational, medical, environmental, and emergency information throughout the island group. Earth stations are located at colleges or other educational or government institutions and provide access to the Internet, voice exchanges among the islands, and access to resources in the United States and the rest of the world. PEACESAT terminals are community resource centers that have not only encouraged development of partnerships on each island, but also have strengthened partnerships among organizations on different islands and in different countries.[15]

## Forming New Communities of Interest

As networks bind existing neighborhoods and communities together electronically, they simultaneously open limitless opportunities to join "virtual" communities that know no geographic bounds. These new communities consist of people of like minds or interests who communicate electronically from any place on Earth.

A virtual community can include anyone, of any age. It may consist of people who link up over the Internet to play chess, talk about the problems of dating, discuss politics, argue about literature, trade tales of experiences in the Second World War, swap information about home improvements, or talk about school.

But a virtual community may also consist of people who tap into a common resource. An example is the partnership run by the University of Cincinnati Medical Center, which provides health information to citizens of the Ohio Valley. Information on prescription drugs, diseases, wellness and general health,

### E-Mail Transmits Key Message

In early October 1995, residents of an urban neighborhood became concerned about police handling of the alleged murder of a young man. They sought out the block captain of their low-income housing development, operated by a nonprofit agency, for guidance.

The block captain, working out of a community center, consulted his electronic database and found an e-mail message, just received, announcing the appointment of a director of community policing for the nonprofit agency. The block captain contacted that person, a nun, who had been on the job just 6 days. The nun promptly talked with the residents, set up a meeting with police precinct officials, led the residents to the meeting, and joined in presenting their views. Relations between residents and police were much improved by the meeting.

### *What Really Happens When Families Go Online*

A newly completed study of the uses of computers and the Information Superhighway within the family, conducted by the New York–based Find/SVP and Grunwald Associates, found that:

- In 64 percent of families with computers, television viewing by children declines, and in 75 percent of households where the computer is enhanced with multimedia capability and a CD-ROM drive, it declines even further.
- Children with online services use their setups most often to reference information and write homework papers, and to a lesser degree to participate in chatgroups, play games, send e-mail, and keep up with news. (Less than 40 percent of their time on the computer involves playing games.)
- Girls with computers log on for an average of 9.6 hours a week during the Pre-K to third-grade years and 10 hours during high school years.
- Boys with computers log on for an average of 6.6 hours a week during the Pre-K to third-grade years and 12.3 hours a week during high school years.
- Children with online services log on an average of three times a week for a total of 1.5 hours; adults log on an average of 6.4 hours a week.
- Children who go online are more likely than other children to be involved in sports, outside activities, volunteer activities, and private lessons in music and dance.
- Mothers are as likely as fathers to use a computer in the home: mothers use the computer for activities such as running home businesses, keeping track of the household budget, personal learning activities, online searching, and volunteering, while fathers' use is primarily for work-related activities.

The 9-month study involved 12 focus groups, followed by a survey of 1,200 family households. It was sponsored by more than 20 U.S. learning, computer, and media companies—*Phillips Business Information. Oct. 27, 1995.* Interactive Marketing News *2:22.*

alternative therapies, insurance, physician referrals, regional online service providers, and other channels for health care are all provided. Anyone with a computer in the tri-State region can access this information—it is available at public workstations in libraries, health clinics, hospital waiting rooms, and pharmacies.[16]

## Improving Emergency Management and Public Safety

The Information Superhighway is creating new and expanded opportunities for coordination among emergency and law enforcement agencies, enabling them to better communicate with and serve communities. These agencies are now typically equipped with up-to-date communications systems, but often lack the ability to communicate quickly and effectively with each other, especially during high-stress episodes such as natural disasters and civil disorders and in unusually demanding situations such as search-and-rescue in remote areas or under hazardous conditions.

The Information Superhighway provides new opportunities for emergency management and law enforcement to exchange vital information under difficult and changing circumstances. As new systems are developed and implemented, people in every community of the United States will benefit.

## EMBRACING THE BENEFITS: MANAGING THE CONCERNS

Even with these many benefits of the Information Superhighway, many are worried about what universal access will mean to themselves, their families, or their business. For instance:

- Parents are concerned that their children may gain easy access to inappropriate material via the Internet or other networks, or come into contact with dangerous people through online conversations.
- Business managers fear the loss of sensitive proprietary data or information that their customers think is held in strict confidence.
- Individuals are worried that private financial, health, or other information about themselves will get into the wrong hands.
- Creative interests and content providers are concerned that their property rights may be infringed.

These concerns are valid, but as people all over America have learned, they are also manageable. For example, you can:

- Learn what others have done to deal with difficult issues by turning to Section 3 of this guide; and
- Get on an online network and share concerns with others.

## SUMMARY

If properly developed and deployed, the Information Superhighway has the capacity to narrow the gap between individuals in this society, whether that gap is based on economic, ethnic, geographical, or other factors. These benefits will not be realized without hard work and the vigilance to include all segments of our society. However, it is already opening doors of career opportunities to any person, anywhere in the Nation, who has access to a computer keyboard, a screen, the right software, a modem, and some training. It is already bringing new excitement and educational resources into teaching environments. It is already helping businesses to perform more efficiently and effectively. It is already giving people throughout the Nation a new sense of community and belonging.

The benefits of the Information Superhighway are there and waiting, and as more and more schools, libraries, community centers, businesses, government agencies, and individuals travel its many arteries, the resources each adds will increase the benefits for all.

# part 2
# Highlighting the Ingredients of Success

President Clinton and Vice President Gore have established a national goal that calls for every school in America to be connected to the Information Superhighway by the year 2000. They envision an America of schools and other important institutions linked to a Superhighway built by the private and not-for-profit sectors.

The Council applauds and endorses the Administration's vision and goals. The question now arises: How does the Nation best move from the Administration's vision and goals to plan and implementation? The Council's answer is that communities take the lead in connecting people to the Superhighway through schools, libraries, and community centers.

A community must begin with forming and articulating its vision and goals for joining the Superhighway. What do they want to accomplish, i.e., in what timeframe for what users? For instance, a school system may want to implement effective computer learning as well as to communicate via the Information Superhighway. This vision needs to include a plan for what technology must be acquired and put into place and for how to train personnel to enhance learning using the systems. In addition, the goals need to include what kind of content—the finding, using, and creating of information—is most effective in bringing the fun and benefits of the Superhighway to the target group.

The Council examined this process all over the country and identified these four ingredients of success:

- Leadership;
- Technology;
- Training and professional development; and
- Content.

## LEADERSHIP

Leadership is critical: Every successful community effort has a champion—an energetic, visionary individual who gathers wider leadership support from various sectors of the community. And, one of the interesting facets of a KickStart Initiative is that almost anyone can catalyze and lead the effort:

- In the Issaquah School District, Issaquah, Washington, it was a student's father who developed the plan to bring the Information Superhighway to the more than 10,500 students and 1,000 teachers and staff in the district's 21 schools and 3 administrative sites using funds that had been earmarked for the project;

> "You should have been there to see their faces [teachers attending a computer workshop] and feel the excitement in the room when they realized what they had learned. There was even one teacher that decided to take a powerbook home and work on it during the summer. This teacher could not turn the computer on when the day started. . . . I feel if we can introduce the teachers to computers and technology in a very unintimidating way we will see success. . . . If you can get them to play with a computer, I guarantee you they will be hooked."—*Elaine Devers, parent, school technology coordinator and workshop instructor, Kentucky*

- In the Chestnut Ridge School District, Fishertown, Pennsylvania, it was the district's technical coordinator, with the support from teachers, who found the funds needed to implement the Superhighway and train those who would teach others;
- In a small parochial school in Baltimore, Maryland, it was a corporate sponsor who saw a school in trouble and decided to step in and save it;
- In Lansing, Michigan, it was the local television station's general manager who came up with the idea of getting area students online to learn about current events;
- In Taos, New Mexico, it was two young leaders of a grassroots nonprofit organization that led the way to the development of a network that is helping community members gain new skills; and
- In the State of North Carolina, it was the Governor who called for a statewide effort to connect all schools, libraries, medical, and government facilities.

These leaders, and others who have led successful connection efforts, took on the task because they believed in the educational, social, and economic benefits of being connected. Some knew and understood the technologies and other requirements for successful connections at the onset. Others did not. All were able to garner the support—both financial and technical—needed to carry out their project as a result of their vision, commitment, and hard work.

## TECHNOLOGY

All connections to the Information Superhighway—whether for voice, data, graphics, or other types of information—require equipment, software, and access to the network. The specific technologies employed, however, depend on the goals of connection, the facilities to be connected, and the budget for the project. For instance:

- In the Christopher Columbus School in Union City, New Jersey, computers were supplied in the school and at the homes of students so that teachers, students, and parents could communicate even during nonschool hours. To begin with, they used plain old telephone lines and later added ISDN lines and multimedia server technology to the network.
- At the Clear View Elementary School in Chula Vista, California, they have integrated the use of technology into the curriculum and use 10 computers in each classroom. In addition, they use a broadband connection to access a multisubject laser disk jukebox located 8 miles from the school. They also use satellite and cable connections to access online resources.
- At Ralph Bunche Elementary School in Harlem, New York, a "mini-school" has been created to foster computer-assisted learning. In this mini-school, computers are connected to each other on a LAN and to the outside world through a WAN.

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### *Wireless Communications Help Bring the Superhighway to Older Schools*

Nearly half the school buildings in the United States were constructed 50 or more years ago. Many are insulated with asbestos. This makes installing telephones and computer cables difficult, costly, and dangerous. For these schools, wireless telecommunications are proving an effective means for accessing the Information Superhighway.

At a Richardson, Texas, junior high school, more than 350 hours a week—about $7,000—were saved in overall staff time that would normally have been spent confirming attendance, dealing with schedule changes, requesting textbooks, and communicating with parents and other school personnel. Teachers reported that telephones in the classroom saved substantial time that would have been spent traveling the halls to talk to others (savings amounted to approximately 15-1/2 days of teaching time per year).

ClassLink, an initiative of the Cellular Telecommunications Industry Association (CTIA) Foundation, Washington, D.C., will bring wireless communications—including wireless access to the Internet—to 100 schools across the Nation. The effort evolved as a result of the Richardson program—where Southwestern Bell Mobile Systems donated both wireless telecommunications equipment and airtime—and is currently being tested in two schools in Washington, D.C., through support from Bell Atlantic Mobile. CTIA members are funding ClassLink's wireless equipment through cash contributions and donated airtime.

## Technology Choices Reflect Goals and Available Resources—Financial and Human

### Information Equipment: From Telephones to Computers to TVs

- **Telephones and faxes:** Telephones and fax machines, commonly available for administrative purposes, are rapidly becoming useful in classrooms as well. Voice mail has also been used effectively by many school districts to share information over the phone system among teachers and administrators, parents, and other community members.
- **Computers:** Like telephones, these come in varying degrees of sophistication and cost. Most schools, libraries, and community centers start with simple multimedia computers and add technology capability as they evolve their needs and capabilities.
- **TVs and VCRs:** Many schools, libraries, and community centers are beginning to use TV hookups for access to cable shows, for distance education, and for showing educational shows over VCRs.

### Network Access

- **Network access:** Plain old telephone lines (POTS) are typically used for voice mail and, with the addition of modems, data at low speeds. Integrated Services Digital Network (ISDN) lines transmit data and images at about twice the speed of a regular phone line, which allow some multimedia materials to be used. T-1 lines are leased lines for point-to-point communication and allow data and images to flow at 50 to 60 times the speed of a regular phone line. T-3 lines transmit data and images at 1,500 times the speed of a regular telephone line. Some technology choices include optical fiber, coaxial cable, hybrids of coax and fiber, wireless, and satellite. The choice of technology will determine the speed and quality of the network access.

### Networking

- **Local area networks (LANs):** LANs link computers together that are in the same proximity/locale—computers in the same office building or school. When linked through a LAN, computers can share data files and peripherals such as printers and scanners.
- **Wide area networks (WANs):** More capable networks beyond the local building(s) which enable users to share information across large geographical distances (e.g., school-to-library, State-to-State, or across the globe). WANs can also be used to interconnect a number of LANs at different sites (e.g., all the schools in the district). Other technologies, such as bridges and routers which route the data, must be purchased as well.

### Content Resources

- **Databases**: Access to databases in other places, including libraries and museums, has enriched many learning programs.
- **Software**: CD-ROMs, electronic mail, word processing programs, integrated office products which contain several capabilities combined (e.g., word processing and spreadsheets and graphics), and educational software have all been used effectively by many schools, libraries, and community centers.
- **Live communication:** Communicate with content and technology experts, colleagues, community and business partners, parents, and other learners.
- **Curriculum resources:** Subject matter and problemsolving materials, curriculum frameworks, workforce knowledge and skills resources, strategies for curriculum planning and interactive curriculum learning materials have been used by schools to organize teaching and learning.

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- In the J.O. Wilson Elementary School, Washington, D.C., and the Richardson West Junior High School, Richardson, Texas, they are using wireless technologies (cellular phones and wireless LANs) to overcome the difficulty of installing cables in older buildings.
- In Hawaii, the State government has implemented several statewide infrastructure initiatives that satisfy the State's goal of providing access to all learners. These include I-Net, which links elementary and secondary schools, the University of Hawaii, and 50 district and State offices.

- In North Carolina, the State has invested in a statewide information infrastructure to meet its goal of using the information technology as a "strategic tool for economic growth and social welfare."

These are only a few examples of the kinds of technologies being employed to access the Information Superhighway. In most instances, successful initiatives evolved through several phases—beginning with a standalone computer with communications capabilities and standalone video players and television sets and growing into full-fledged local area and wide area networks. As their goals and needs evolve, so do their technology choices.

The choice of technology is often driven by user needs. For example, persons with disabilities often require additional features, and/or specialized equipment both to access and to interact over the Information Superhighway. For the past 10 years, computer and software manufacturers have been working to integrate disability access features into their standard, mass-marketed products. As a result, a number of assistive technologies are now available to ease access to the Superhighway by disabled persons, and disability access features are now being incorporated directly into most of the major operating system environments in the computer industry. Equipment can now be purchased that has built-in features such as text or screen enlargers, keyboard alternatives to the mouse, single-stroke command features, onscreen substitutes for auditory cues, screen readers, and other features that allow users to customize how they interface with the Information Superhighway.

## TRAINING AND PROFESSIONAL DEVELOPMENT

Every traveler on the Information Superhighway had a mentor at the beginning of the journey—a teacher in school, a co-worker, a librarian, a volunteer at a community center, a parent or family member, a friend, or a fellow student. Although training can occur in many different settings and in many different ways it is essential that every mentor, whether in an academic or other institutional setting, such as a library or community center, receive adequate and ongoing training in how to use the required technologies, and employ the resources of the Superhighway to assist children and adults in their lifelong learning process.

Unless teachers are properly trained, the technology and connections that so many are working to bring into schools, libraries, communities, and other settings will not be used to their fullest potential, or worse yet, left in the corner to gather dust. A 1995 study completed by the Office of Technology Assessment (OTA) elucidates this point. OTA found that 68 percent of the teachers surveyed had access to computers, but that only 42 percent were using them as a part of their curriculum; and that although 50 percent said they had access to educational software, only 32 percent used that software in their classrooms. Kathleen Fulton, project director for the OTA study, comments on the central importance of training teachers: "They've been trying so hard to get technology into the hands of kids that they forget it's the teachers who direct what goes on in the classroom." The same is true for mentors in libraries and community centers.

### *Texas' Education Network Gets Teachers Online and Working Together*

When educators and librarians in Texas are looking for peer support, professional development activities, ideas for lessons, or views on particular teaching approaches, they go to their computers and access the Texas Education Network (TENET). In the words of Connie Stout, director of the network, "Considering how isolated teachers are from each other in classrooms during the school day, it is frequently easier to consult with colleagues via TENET because time and place no longer matter. For teachers in our rural communities, the opportunities provided to exchange ideas with colleagues is a reality for the first time."

Established by Texas statute in August 1991, this network was specifically designed to assist in the collaboration and exchange of information between and among schools, district offices, educational service centers, the Texas Education Agency, and other State and educational entities. It is doing just that. Although the network had only 500 users when it was established in February 1995, 44,000 members of the State's community of educators were using it for an average of 15.5 logins per month.

TENET is funded by the Texas Education Agency, and administered and operated by the University of Texas at Austin.

**Figure 1. Technology Skill Stages for Teachers**

| Skill Stage | Description | Professional Development Needed* |
|---|---|---|
| Entry | Teachers struggle to cope with technology and new learning environment, or have no experience at all. | — |
| Adoption | Teacher moves from initial struggle to successful use of technology at a basic level (e.g., can use drill and practices software). | ■ 30 hours training |
| Adaptation | Teacher moves from basic use to discovery of potential in a variety of applications. Teacher has good operational knowledge of hardware and can perform basic troubleshooting. | ■ 45+ hours training<br>■ 3 months experience<br>■ Just-in-time support |
| Appropriation | Teacher has mastery over the technology and can use it to accomplish a variety of instructional and classroom management goals. Teacher has strong knowledge of hardware, local area networks, and wide area networks. | ■ 60+ hours training<br>■ 2 years experience<br>■ Just-in-time support |
| Invention | Teacher actively develops entirely new learning skills that utilize technology as a flexible tool. | ■ 80+ hours training<br>■ 4-5 years experience<br>■ Just-in-time support |

* Required times for professional development are cumulative.

**Source:** McKinsey & Company, Inc.; U.S. Congress, Office of Technology Assessment; Teaching Matters.

Although much of the training "mentors" receive is on an ad hoc basis, a number of schools, school districts, universities, public, private, and nonprofit organizations are developing and offering training programs for in-service teachers, student teachers, librarians, and others who will be expected to teach children and adults to use information technologies. For instance:

- In Albuquerque, New Mexico, teachers can attend a voluntary training course at the school district's training center. Those who complete the course are certified as "in-house advisers" within Albuquerque's 110 schools. As in-house advisors the teachers are expected to help their peers learn to use computers in their classrooms. In addition, they serve as a resource on such issues as software and hardware compatibility.
- In Mission Viejo, California's Saddleback Valley Unified School District, in 4 of its 36 schools, laptop computers are available for teachers to take home, where they can train themselves at their convenience. During the school day, these computers are set up, 12 at a time, on library carts that are moved from classroom to classroom for students' use.
- At the University of Maryland, student teachers are required to take courses on computers and to learn how to teach using the Internet, so

### *Tennessee's Virtual School Teaches Teachers to Embrace Computers*

In just 3 years, Tennessee's Virtual School has transformed 11,000 of the State's 50,000 K-12 teachers from computer illiterates to seasoned travelers on the Information Superhighway. Many of these new converts were once afraid of the Information Age, but today they are teaching their peers and actively engaging their students in learning with the assistance of worldwide electronic resources. Teachers, librarians, counselors, and their students across all Tennessee counties now make use of the Virtual School.

Educators now employ the Virtual School to communicate with one another, share curriculum materials, develop classroom projects, and access the Internet, mostly for student-related purposes. Three curriculum projects have been developed with funding from Eisenhower Foundation, Appalachian Regional Education Lab, and BellSouth Corporation. The State appropriated money for 800-number access and is equipping all 1,500 of its libraries with a computer and modem and has set a priority for training library personnel and aligning the program with its statewide 21st-century classroom technology initiative.

that they will be prepared to teach using Information Superhighway resources once they move into the Nation's classrooms.

- The National Alliance for Restructuring Education opened four Apple Classrooms of Tomorrow (ACOT) teacher development centers. Located in California, Kentucky, Vermont, and Washington, these centers offer teachers the opportunity to participate in 1-week practicums on how to use technology in the classroom. Participants in the program learn by observing and working with ACOT teachers and students in actual classroom settings. Project coordinators guide participating teachers as they examine student outcomes, learn about new technologies, and develop instruction that integrates technology into their curriculum.
- In Texas, every prospective teacher is being encouraged to purchase a laptop computer for lesson planning, telecommunications, recordkeeping, and instruction as a result of the Houston Consortium's drive to redesign teacher education. To encourage the integration of technology into the pre-service education of teachers, the Consortium also supplies every participating K-12 school with a telecommunications center and portable multimedia station for use by pre-service and in-service teachers; individual laptop computers for professional development of up to 6 faculty members; and a computer classroom (5 computers for instruction and 10 laptops for students) to each participating university or college of education. Training on the use of the technology and its integration into the curriculum is also provided.

**"All the computers, telephones, fax machines, scanners, cameras, keyboards, televisions, monitors, printers, switches, routers, wires, cable, networks, and satellites in the world will not create a successful [Information Superhighway] if there is not content."**—*Bruce Lehman, Assistant Secretary of Commerce and Commissioner of Patents and Trademarks*

"In this age, content becomes outdated so quickly that schools must encourage independence and teach learning how to master the process of acquiring content"—*Barbara Sylvester, education professor, Austin College. Source: Kevin Helliker,* The Wall Street Journal, *"Texas Tech," Nov. 13, 1995, p. R18*

## CONTENT

Content—the ideas, information, pictures, music, and other material that flow over the Information Superhighway—is the final and in many ways most exciting and critical ingredient of this new tool of the Information Age. Every Superhighway success story involves having, creating, and integrating content in a way that encourages children to learn, makes everyday tasks easier and quicker, helps people communicate faster and more frequently, and makes life more enjoyable and interesting.

With each passing minute new resources are added to the already vast information, services, education, cultural, business, and recreational content of the Superhighway. Some is targeted to specific populations groups—schoolchildren, parents, or senior citizens, for example. Some is meant for specific professionals—businesspersons, educators, policymakers, law enforcement personnel, or persons in the medical community. Some is intended to fulfill information needs about local events, weather, news, and the like. And some is simply intended to help people enjoy their leisure time by finding a good restaurant or movie, listening to music, or playing a game.

In looking at the many kinds of resources now available, the Council found that persons from all walks of life and every possible profession are finding innovative ways to use the Superhighway to benefit others. The volume of useful, interesting resources available is growing and changing at such a rapid pace that it is nearly impossible to describe the new uses for this technology in the coming year, let alone the coming decade. Today, however, users can find such resources as the following:

- In 60 cities and across 1,000 schools and universities real-time meteorological data is brought into school and local communities via the AWS Nationwide School Weather Network. Each participating schools has an AWS automated weather system and interactive telecommunications software that allows real-time data to be collected from any site and integrated into daily classroom activities. Local television weathercasters in participating cities routinely integrate data generated from these schools into their weathercasts.
- Sponsored by Columbia University, New York City, "Go Ask Alice" provides young people with health information they might feel uncomfortable asking for in a face-to-face meeting with a physician. Information available through this services falls into five categories: sexual health and relationships, physical health and nutrition, alcohol and drugs, emotional health and well-being, and general health. The service is staffed by a health professional who reviews questions and develops generalized responses.
- Headquartered in Washington, D.C., the Consortium for School Networking (CoSN) offers a variety of discussion forums where parents and educators can consult with each other and learn. Current forums include curriculum, technology, professional development, teacher education, parental issues in involvement and technology, and electronic publishing.
- Throughout the United States, USA CityLine allows cities and towns to include information about their localities on the Internet. For instance, Orlando, one of the most popular vacation destinations in the world, provides information about accommodations, attractions, businesses, real estate, local government—including statistics, taxes, licensing—restaurants, golf courses, nightlife, television, radio, events, shopping, tours, transportation, and travel agencies.
- Students and teachers throughout the United States now have the opportunity to travel with scientists to study natural phenomena such as volcanos, rare animals, birds, and marine species, and other aspects of Earth through the Jason Project. Established in 1989, this project is intended to excite and engage students in science and technology while providing teachers with opportunities for professional development.

# part 3
# Showcasing Success Stories

All across the United States, people are building elements of the Information Superhighway. Some are installing computers and obtaining interactive software in schools, libraries, museums, and community centers. Others are setting up online networks for nonprofit and public agencies at the community, regional, town, or city level. And still others are implementing plans to interconnect an entire State.

Every one of these people has an interesting story to tell—when they first experienced their dream of joining the Information Superhighway, how they got their equipment, who taught them how to use it, how long it took to feel like a Superhighway pro, and most importantly, the people they met, the places they have "visited," and the things they have learned and experienced online.

When teachers talk about how the Information Superhighway has affected their classrooms, they relate stories of reawakening of students who at one time spent their days waiting for dismissal, but are now coming in early and giving up recesses—just to get a few extra minutes online. Librarians speak of adults using their online facilities to learn new job skills. Community center administrators talk of once-lonely seniors who have made new friends and gotten a new lease on life through online chatrooms. Stories of how the Information Superhighway has improved lives are endless—each inspiring in its own right. Stories of how institutions achieve access to the Superhighway, although peppered with unique components, are in large part quite similar.

## SCHOOLS

In some ways, schools are the most important component of the Information Superhighway. Their success in implementing and instructing students on the use of Information Age technologies may determine how well children assimilate into the working world. Some of the steps schools have taken to implement these technologies and the ways teachers and students are making use of them are described below.

## If Chestnut Ridge Can Do It, Anybody Can

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Chestnut Ridge School District is rural, poor, and small. Located in south central Pennsylvania, the district is 30.miles from end to end and serves 1,900 children. The local library's budget, which was already small, was cut by nearly 30 percent from 1994 to 1995. And, because there is no toll-fee Internet access in the community, the library director believed that Internet use in that facility would probably kill it financially.

Yet, in this poor community, the school district believes that "Technology can be a catalyst and agent in changing the way teachers teach and students learn . . . [it is] the great equalizer, in a playing field, where unequal amounts of money are spent on educating children," according to Kathy Popp, technical coordinator for the district. Thus, the school district is making every effort to ensure that students get the technological resources they need to be productive members of society, and they're succeeding. They are succeeding because they have built partnerships with the local community, and have spent a lot of one-on-one time with community leaders—both supporters and opponents of access.

The school district searches for resources wherever they can find them. In 1993, three teachers received a GTE Pioneering Partners Award that included 5 free hours of Internet access per month for each recipient. During the school year, a score of teachers and administrators have been trained with those free hours. In 1995, the district aggressively pursued another Pioneer Award, simply to get three more accounts with 5 hours each of monthly Internet time. It won again, and teachers traveled more than 30 miles to the local university's crowded computer labs to use the accounts. Some teachers also purchased America Online time and paid the toll charges themselves just to get the technology in their classrooms.

**"Most people are waiting for the Internet to happen to them. We feel that every day that our children do not have access to the Information Superhighway is one day less of an excellent education for them. One day less for the "have not" children."*—Kathy Popp, technical coordinator, Chestnut Ridge School District, Fishertown, Pennsylvania***

The commitment of the school to connectivity was further evidenced when funds were budgeted for a 56-Kbps line. Funding the line meant that a high school teacher position was left unfilled and supplies were cut. To get additional funds teachers teamed with a neighboring school district to create an Internet course for teachers and librarians. The course will be taught by teachers in the school and take place in summer 1996.

Finally, in partnership with Bedford County Library, the school district applied for a Goals 2000 grant. The $25,000 award will pay for Internet access during the 1995-1996 school year. It may be touch and go, but if this school district can do it, anybody can.

Educators in Chestnut Ridge see unlimited use of the Information Superhighway as the books they don't have on their library shelves, the experts they would like to have on staff, a means to bring people together for retraining, a means for breaking out of the professional isolation of living and working in a small town, and, most importantly, as a means for children to be on the same playing field as those in more privileged communities.

## Inner-City Children Take a Front Seat to Learning

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On October 25, 1994, students at Rosa Parks Elementary School took their first ride on the Information Superhighway, visiting their school's namesake—the woman whose dignity and determination changed history and launched the Civil Rights Movement. Along with parents and teachers, students participated in a video conference that carried Rosa Parks' voice and video image from a Detroit office to their Northwest Baltimore classroom. Just as Mrs. Parks' actions in Montgomery were amplified by the larger movement she helped inspire, her school visit energized an initiative that is transforming a school and a community.

Three years ago the Rosa Parks School was ready to close. Enrollment was falling. Test scores were the lowest in the archdiocese. Faculty morale was declining. Even the building itself seemed about to collapse. In spring 1994, MCI Communications Corporation adopted Rosa Parks, beginning a three-step program to improve curriculum, integrate technology, and expand the school's communications infrastructure.

Already, the school has seen dramatic results. Standardized test scores are up—way up. Where low scores once drew the scrutiny of State and local regulators, students at Rosa Parks now perform above average within their high-achieving parochial school district. One class, tracked over 3 years, raised their percentile rank against other students in the archdiocese an amazing 20 percentage points. Morale is high—among students and among faculty—and enrollment is rising.

**". . . [they're learning] cooperative skills and motivational skills and study skills, as well as technological skills. Even the inevitable tough cases every school has have been changed by the computers. Now they ask me: If I'm good today, can I play on your computer?"—*Joanne Rojas, principal, Rosa Parks Interparish Elementary School, Baltimore, Maryland***

Technology is the linchpin of this effort, but it is seen as a tool to draw students into the larger curriculum, not a cure-all. At first, in fact, the school focused on low-tech basics: training teachers; new textbooks; a more integrated role for parents; and curriculum that emphasizes reading and math, but includes violence prevention, child abuse prevention, and tolerance education programs. On this solid foundation was constructed a technical infrastructure almost unheard of for an inner-city school. In summer 1994, multimedia computers with a full suite of software and telephone access were placed in the classrooms. One computer—centrally located in the computer lab—got a dedicated phone line and the desktop video system used during Mrs. Parks' visit.

The teachers, truly the keys to this project, responded by making the computers part of the curriculum from day one. The computers have become a classroom focal point. They demand skills and serious thought from students, and reward them with new, almost unlimited vistas and opportunities. Students who rarely travel beyond the city limits find themselves with the world at their fingertips. They e-mail friends across America and around the globe. They access vast and growing libraries of information. And they glimpse the great distances their hard work and new skills can carry them.

The next step is full connectivity with other schools in MCI's SchoolLink network and global connectivity. Despite the hardships many of them face every day, when the students of Rosa Parks travel the Superhighway they proudly ride—like the legend whose name their school carries—in the front.

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## Saving Money and Improving Educational Opportunities

In 1994, Guilford County became the first school system in North Carolina to equip and network all high schools for distance learning. Although it is too soon to determine if student achievement levels have improved, two changes are certain; school attendance rates are up and discipline problems are down. As evidence of the excitement over new opportunities for learning, 122 high school students, and 18 math teachers recently enrolled in a night class on practical applications of graphing calculators taught by a noted university professor; numerous biology students participated in a 3-day electronic field trip to Kenya to study African wildlife; and more than 1,200 fourth-grade students recently learned how to improve their scores on the North Carolina writing examination by receiving instruction and practice through interactive lessons.

Today, the districtwide interactive video network regularly serves 3,000 users and is available to another 54,000—students, teachers, parents, and other members of the Guilford County community. In addition to enhancing academic opportunities for students, the network is also being used for staff development, PTA meetings, community economic development conferences, and training area public health professionals.

Because of the network, distance learning labs allow Guilford County to provide course equity both locally and statewide. Students have access to courses previously unavailable due to low enrollment at their school or the lack of a qualified instructor. As an additional benefit, the network has resulted in real cost savings for the school district by eliminating unnecessary travel, reducing busing, and through more efficient use of staff time. For instance, a recent 30-minute curriculum planning meeting of three people on the network saved 72 miles in travel reimbursement, more than 3 staff hours of professional salaries, and the equivalent in lost productivity time. Students learning French IV over the network are no longer bused to their class, which saves salary, fuel, and maintenance costs.

Guilford County got its network off the ground with $1.7 million in local funds. The superintendent of schools and the school board were so committed to the project that they revised the entire school system budget to fund network construction. At a time when State funding was uncertain, Guilford County went to the forefront and began construction.

Guilford County remains fully committed to promoting the values of the Information Superhighway and is striving to expand its capabilities. The county is currently implementing a pilot project to add Internet access to a high school, middle school, elementary school, education center, and administrative office. School district officials are constantly reaching out to every segment of their community to encourage use of and support for the network through media coverage, special events, PTA meetings, open house demonstrations, and professional conferences. In 1995, the National School Boards Association selected Guilford County as the premier school of the year.

## Turning an Inner-City School Around

Union City, New Jersey, is a community of ethnic and cultural diversity with a predominantly immigrant Latino population. With nearly 42,000 residents per square mile, it is the most densely populated city in the country. The Board of Education serves 8,361 students in 11 schools (8 elementary, 1 middle, and 2 high schools).

Like many urban school districts, Union City has faced many educational challenges. In 1989, it was identified as one of New Jersey's 30 special-needs districts for education. Student dropout and transfer rates were high, and standardized test scores were well below State averages. When the State investigated Union City schools, the district received failing grades in 40 out of the 52 areas studied. Union City was given 5 years to improve its schools or have them taken over by the State.

Union City responded by creating a curriculum that supports the development of thinking, reasoning, and collaboration skills. Under this plan, students learn by doing, and are expected to demonstrate proficiencies by writing research papers and completing projects. Simultaneously, the school board made significant changes in the physical environments of its schools. A bond initiative passed by Union City residents helped the district refurbish all of the schools and many individual classrooms, and funds from New Jersey's Quality Education Act provided the capital needed to install 775 computers in the district—establishing an 11-to-1 ratio of students to computers.

This program was created through a partnership of the Bell Atlantic Corporation, the Union City Board of Education, and the Education Development Center's Center for Children and Technology. The 2-year trial began in September 1993. Computers were supplied at the school and in the homes of all of Christopher Columbus' 135 seventh-grade students and their teachers. Teachers were trained on use of the computer systems and they trained the parents. The technology enabled participants to communicate between school and home, and use a set of basic software tools to carry out a wide range of curriculum activities. Later, very high-bit rate digital subscriber lines and audio/video server technology were integrated into the network. Participants gradually became accustomed to using computers by being introduced only to e-mail in the first year. During the second year, additional multimedia resources were integrated into the school and its curriculum.

Recent test scores and other data demonstrate just how successful the program has been. Student test scores for Christopher Columbus School on New Jersey's Early Warning Test in reading, math, and writing are now more than 10 points above the statewide average—across the board. Absenteeism by students and teachers is very low, and the dropout rate is now almost nonexistent (transfers into the school are high, and transfers out are very low). Parents who could not speak English just 2 years ago are now actively involved with their children's use of the computers at home and frequently send messages to teachers and the school principal.

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"I have seen the future of education and it's in Union City, NJ."—*Linda Roberts, DoEd*

"I find that my students want to write more, and they are reading more because they are using the computer and it's very patient. They are corresponding with each other, and they are corresponding with me through e-mail."—*a teacher, Christopher Columbus School, Union City, New Jersey*

"As opposed to hearing groans about assignments, they are excited about 'where are we going to find it,' and 'if it's not here let's try down at the media center.' There's a sense of anticipation about how to go about researching,"—*a teacher, Christopher Columbus School, Union City, New Jersey*

## Computer-Assisted Learning Brings Educational Opportunities to a Largely Immigrant Population

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Clear View Elementary is located in Chula Vista, California, 8 miles from the Mexican border. Its students, many of whom come from low-income families, are simultaneously starting new lives in a new country, learning a new language, and receiving a quality education because of the computer-assisted educational opportunity offered at their local public elementary school.

The scene in every classroom at Clear View is the same: 10 children working on computers, another 10 receiving instruction from the teacher, and the remaining students working at their desks using manipulatives. This is a school where English is a second or new language for 68 percent of its 550 students. Since 1991, Clear View—a Cox Communications International Model Technology School—has been completely networked with fiber, satellite, and cable. Every class has a technology component, thus, even the youngest kindergarten children use computers at some basic level. By first grade Clear View students use computers to activate a LEGO town that they build from scratch, and fourth through sixth graders are experiencing global awareness through the Internet.

Clear View's technological transformation is in part due to a joint venture with San Diego University. The school was originally designed as a professional development school where student teachers could get direct experience in an academic environment. To accommodate this, the school includes a classroom where one-way glass permits student teachers to observe classes.

**"We see computers as manipulatives—tools to promote thinking and educational risk-taking on the part of students and teachers. . . . Because of what they have been exposed to at Clear View, [children who graduate from our elementary school] are pushing the bar at middle school. . . . They don't want to sit in rows and read books. They want to talk about it, give their opinion, produce things. Now they are having the same effect in high school. Let's raise the bar for all kids."**—*Dr. Ginger Hovenic, principal, Clear View Elementary School, Chula Vista, California*

Clear View's principal, Ginger Hovenic, deserves much of the credit for the technology in the school's classrooms. She has pursued and been awarded public funds for educational restructuring grants, as well has donations and support from the business community. Her desire to provide "the best education possible for ALL students" has motivated partnerships with businesses and foundations that have in turn resulted in creative projects that have opened the schoolhouse doors: Clear View students have communicated and shared weather data with other students around the Nation via computer modem; written and published a book about Supreme Court Justice John Marshall, in collaboration with a San Diego State University history professor; put scientific methods to work using an electron microscope located 26 miles away, under the direction of a biology professor at San Diego State; and exchanged thoughts and research about V-E Day, World War II, with students in Rhode Island, Nebraska, and England. The school has also formed such innovative programs as parenting skills workshops and voice mail for each teacher, which provides a 24-hour-a-day communication link among teachers, parents, and students for homework assignments, school events, and other news. Curriculum innovations—such as the families program, where students are regrouped for 45 minutes each week into 25 K-6 groups to study social, environmental, and global issues—build skills to facilitate student success in and out of the schoolroom.

**"Teaching and learning with computers gives teachers a chance to help students who have fallen slightly behind. It's a lot easier to bring a child to speed who has fallen 15 minutes behind than to let those 15 minutes turn into days."**—*Dr. Ginger Hovenic, principal, Clear View Elementary School, Chula Vista, California*

Techniques developed and successfully employed at Clear View are being disseminated through a staff development program that trains educators from across the Nation in the school's assessment and technology innovations.

## Progressing to Smart Classrooms

Over the past decade, the Hueneme School District in Port Hueneme, California, has used State and Federal grant seed money, local resources, and significant assistance from private industry to fuel an aggressive research and development program and create networked smart classrooms that seamlessly integrate dissimilar data, audio, and video learning resources for teachers and students—on demand. It has also explored the potential of distance learning/telecommunications, and established classroom-to-classroom and school-to-school networks within Hueneme, and across the Nation.

Located in an agricultural strip, halfway between Los Angeles and Santa Barbara, the school district serves 7,800 K-8 students through nine K-6 elementary schools and two junior high schools. More than half of the district's students come from low-income households, and approximately 30 percent have limited-proficiency or no English at the time they register for school. The school district turned to computer-assisted instruction in part as a means to fundamentally change and improve the way these children learn. Begun in 1983, the move to smart classrooms has been a long process, but results have been phenomenal:

- Students have exhibited significant increases in achievement levels.
- In 1992, eighth-grade students scored at the 90th percentile and above in math, history/social studies, science, and writing.
- Students scored 24 scaled points above the State average.
- Critical thinking skills, measured through several different exams, rose from the 40th to the 80th percentile.
- Parents, students, and teachers have a supportive and strong attitude toward technology. Average daily attendance has increased, and discipline problems have declined.

For Hueneme students, technology and connectivity provide an exciting learning environment for mastering educational basics while learning skills that prepare them for the future. At the junior high, for example, each day begins with a live, schoolwide video broadcast of the day's events that is scripted, produced, recorded, and transmitted over the internal video network by the students.

Hueneme schools now have nearly one computer per student distributed across classrooms and the library, TV monitors in each room, numerous videodisk players, and VCRs, as well as two dedicated cable channels, donated by the local cable company, that enable videoconferencing and broadcasting. Future plans call for Internet connectivity to all classrooms (currently the library has access).

The benefits of technology and connectivity in the Hueneme district have been made possible through the combined support of the district administration, school board, teachers, parents, community leaders, and funds from the Telecommunications and Information Infrastructure Assistance Program (TIIAP), which is administered by the Department of Commerce's National Telecommunications and Information Administration (NTIA). District superintendent, Dr. Ron Rescigno, has provided vision, leadership, and moral support to the critical agents of change, teachers.

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"Based on our results, I can say without reservation that the management and use of networked multimedia technologies have benefited our student body so that they are more competitive with other students in California and the United States."—*Dr. Ron C. Rescigno, superintendent, Hueneme School District, Port Hueneme, California. Testimony before the Congress, Sept. 30, 1994*

"We have a clear focus on technology. The key is to keep experimenting—pushing the envelope—and then integrate what you learn into the next deployment of technology. Teachers here know that they are taking risks when they use educational technology, but they know they have the support of the district. I don't think we are anywhere near to having perfected classroom use of technology. I don't know if we will ever perfect it. There will always be new developments to consider."—*Dr. Ron C. Rescigno, superintendent, Hueneme School District. Testimony before the Congress, Sept. 30, 1994*

## Students as Creators in an Inner-City School

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"The kids are responsible for what goes on the Web site and they have a great sense of ownership of that."—*Paul Reese, computer and technology coordinator, Ralph Bunche School, Harlem, New York*

In the heart of Harlem, New York, students at the Ralph Bunche Elementary School are creating and publishing and communicating on the Information Superhighway. They develop their own projects based on real research problems. For them, posting a survey on their Web site, creating a database, and then analyzing the data received is child's play. And creating and publishing their school newspaper, on their own, is just another fun activity.

Because of the emphasis on creating materials, Ralph Bunche students know a great deal more about issues such as copyright than most children their age and many adults. These issues are dealt with largely on an informal basis, and are incorporated into projects as part of the learning experience. For example, the opportunity to discuss ownership of material and appropriate uses of others' products arose when a student creating his own homepage wanted to illustrate it with a character from *The Simpsons* television program. As creators themselves, these students are getting real-life exposure to and developing a sensitivity toward copyright/ownership issues.

The Ralph Bunche program began in 1986, when teachers started to experiment with computer-assisted teaching as a means of invigorating the learning process. The school soon became one of the first in the Nation to adapt online technology to the classroom environments of very young students. Today, 250 of the 650 students at Ralph Bunche Elementary are learning within the framework of a computer-assisted curriculum in the school's "mini-school"—a computer-filled classroom that is in effect a school within a school. Although the mini-school is available to all children in the fourth, fifth, or sixth grades, classroom space is limited. Children who win places in the mini-school represent a cross section of the school's student population—mostly black or Latino, some with learning disabilities. In the 9 years since program implementation, these students have scored substantially better on standardized math tests and slightly better on reading tests than their peers who study in conventional classroom settings.

The network environment gives students and teachers seamless, user-friendly access to both local area network (LAN) and wide area network (WAN) resources. Two computer rooms/labs are in place, and seven classrooms have been targeted for installation of at least one computer each, networked within the school.

The mini-school was created largely through the efforts of a group of dedicated teachers who worked tirelessly in their free time to get the project off the ground, and funded through Federal and corporate grants and donations, including the Department of Commerce/NTIA's TIIAP program. Among other donations, in 1973, the school received $100,000 in computers from Apple Computer. Today the program is in large part funded by Columbia University; however, it also receives $15,000 per year from the National Science Foundation for a high-speed data line that sends and receives electronic information four times faster than the fastest modems. Although some teachers have taken formal computer classes to learn to use network technologies, teacher training mostly occurred on an ad hoc basis—teachers work with others to develop and implement projects.

## Every Computer is Equipped with a Teenager

The Issaquah, Washington, school district was faced with an opportunity and a problem in 1989. Local voters had just approved $2.7 million for new spending on computer technology, but no one knew what to do with it. Mike Bookey, an Issaquah Middle School parent who specializes in creating integrated computer and telephone networks for major corporations, stepped in with a plan that brought the Information Superhighway to more than 10,500 students and 1,000 teachers and staff in the district's 21 schools and 3 administrative sites. It also turned many student troublemakers into upstanding, outstanding network creators and operators. The result is a superb technology program with 2,000 personal computers to teach advanced academic skills—planned, built, and managed by students.

The project began with just four computers on the network. The next year the students networked a classroom, then the whole school, and finally the whole district. The system grew from a LAN in each school, to a WAN when the individual LANs were wired together, to a WAN hooked into the Internet. In the process, students pulled more than 187,000 feet of twisted-pair wire, installed software, and taught other students, teachers, and staff how to use the system and system applications. In the words of Liberty High School technology instructor Don Robertson, "Every computer here is equipped with a teenager."

What is most interesting about the Issaquah story is what the program has done for the students. Take the case of an "average" teenager, a youngster who was considered a problem student. By the time he had reached middle school he had set an all-time school record for being detained after class. When caught breaking into his school's computer system he was given a choice—join the team or . . . He joined the team, quickly learned the intricacies of pulling cable and other network implementation requirements, was soon teaching his former instructors in system use, and began teaching a software class at a local computer store. Today he is working part-time for Microsoft and finishing high school at the same time. He, like many graduates of the past, will be in demand at local high-tech companies when he has completed his education.

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"With the Internet, my kids see history in the making. They were learning about the end of apartheid as it was happening from the kids in South Africa."—*Barry Vann, geography teacher, Liberty High School, Issaquah, Washington*

## Disabled Children Enter the Mainstream in a Charlestown, MA, Public School

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In a bright, airy classroom at the Harvard-Kent School in Charlestown, Massachusetts, fourth and fifth graders sit in clusters around several computers, engrossed in the colorful, animated images before them. One group solves math problems by working in an onscreen grocery store; another learns social studies by answering questions posed by a fascinating character named Carmen Sandiego. The groups are lively and the students interact with one another; everyone seems involved in the learning process. What isn't so obvious is that some of these students have learning disabilities.

The story of one of Harvard-Kent's third-grade boys is an example. The young man is a wizard on the computer. He types quickly, is able to complete many assignments in the mainstream curriculum—including a short story about a striped Easter bunny, complete with color images. Yet, this same young man has difficulty organizing his thoughts and cannot write legibly. Although he drafts writing assignments by hand, he finishes his work on the computer, incorporating corrections from his teacher. The computer helps him with structure and spelling, and the boy says, "It's fun. . . . All you have to do is push the buttons."

"I can't really tell by looking at the students which kids have reading or learning problems," says Peggy Coyne, director of professional services for the Center for Applied Special Technology (CAST), a Peabody, Massachusetts-based nonprofit organization dedicated to expanding opportunities for individuals with disabilities through innovative uses of computer technology.

Since 1991, CAST has been working with the Boston Public School system and the Special Education Technology Resource Center, Boston Public Schools at Emmanual College, to find ways to successfully, and cost-effectively, educate students with disabilities. Harvard-Kent is a part of CAST's Equal Access project—a program that uses advanced computer technology to make regular public school curricula accessible to all students. According to the school's principal, Jack Halloran, ". . . the Equal Access project has made [my] school a place 'for kids.' By adding the computer to [my] teachers' tool box, CAST has given instructors a powerful tool that allows them to modify programs to meet all kids' needs, regardless of ability."

## Total Integration into the Educational Process

The Dalton School, a 1,300-student private school located in the heart of New York City, has a teaching staff studded with Ph.D.s, the library shelves are stacked with approximately 62,000 works, and school facilities include special studios for the study of subjects such as architecture and dance. It is a learning environment that most students, educators, and parents would envy. But that is only one aspect of what Dalton is giving its students.

In 1990, Dalton instituted a technology plan that has since brought more than 250 computers, 15 videodisk players, 8 flatbed scanners, 10 laser printers, 35 Deskwriters, and 10 CD-ROM drives into their teaching environment. Typically, there are 4 to 6 machines in every classroom, with another 10 in the art/architecture lab and 6 to 8 machines in each of two public computer labs. All machines are networked.

What the students are doing with these machines gives a real glimpse of the classrooms of the 21st century:

- A sixth-grade social studies class is on an architectural dig in the Middle East. Their assignment is to uncover ancient Assyrian artifacts at the site, analyze each artifact, and formulate and defend a thesis about the nature of the place and the people who lived there. The computer simulates the sounds and sights of the operation; one by one, spearheads and ivory pieces appear on the screen.
- A 10th-grade English class is reading *Macbeth*. With a few keystrokes they access illustrations of how artists have depicted Lady Macbeth, including scenes from Hollywood interpretations, which play out over their monitors. A few more keystrokes take them to various essays on the play.
- An astronomy class is calculating the brightness and temperature of stars based on what they see on Palomar plates—grayish films, sprinkled with dark points of light representing stars and nebulae that were recorded by the 48-inch telescope at California's Palomar Observatory—and on what they can glean from a computer program called Voyager.
- Throughout the school, on a average day, more than 400 individual students and faculty members log in to the local area network for conferences related to specific courses or current events. Recently, these extensive and sensitive exchanges among students and between students and faculty have covered such topics as the Rabin assassination, affirmative action, the Million Man March, and free speech vs. civil speech. On a typical day, 19 hours of activity are logged over the LAN.

Dalton students are learning to dig up information and develop an understanding of that information on the basis of raw, observable facts. In the words of the school's headmaster, "[Technology] shifts education from adults giving answers to students seeking answers."

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The Dalton technology plan was the brainchild of a collaborative effort of The Dalton School, and the Institute for Learning Technologies at Teachers College, Columbia University. Funding for the project has been possible in large part by a gift of approximately $3,720,000 from the Phyllis and Robert Tishman Family Fund; in-kind contributions of more than $1.3 million; and a donation of $180,000 from the DeWitt Wallace-Readers Digest Fund. Finally, a grant from the National Science Foundation made possible the installation of two radio telemetry stations at the Black Rock Forest.

Although few schools have the financial and human resources to implement the kind of learning environment that has been developed at Dalton, the program is beginning to benefit others. The school has designed and implemented several highly successful educational prototypes that will be shared with other schools:

- Archaeotype—the networked multimedia archaeological excavation simulation designed to teach social studies and related disciplines;
- Ecotype—a multimedia paleontological field research simulation used to teach middle school earth and life sciences;
- Project Galileo—a cross-platform integration of sky-simulation programs and professional astronomical databases for 11th- and 12th-grade astronomy courses; and
- Hypermedia—a hypermedia environment for use in English and foreign language curricula.

## Traveling with Scientists on the Jason Project

In March 1995, students and teachers from all over the United States had the opportunity to travel to the Big Island of Hawaii to study volcanoes and witness the largest surface lava flow in the area in 25 years. As a part of the journey they learned about how Earth was formed, looked for evidence of volcanic activity in the solar system using NASA's infrared telescope, and studied the unique biology of Hawaii to learn about the concept of adaptive radiation. Students undertook this journey over many months without ever leaving their classrooms by participating in an interactive learning program developed by the Jason Foundation for Education.

The Jason Project was established in 1989 with the intent of providing a means to excite and engage students in science and technology and professional development opportunities for teachers. The project does this by developing annual programs of science and technology curricula, classroom broadcasts, and teacher training, including the 2-week interactive electronic field trips during which students are true participants in scientific expeditions. Since 1989, the Jason Project has taken students and teachers on research expeditions via satellite to: the Great Lakes to examine two perfectly preserved War of 1812 schooners; the Galápagos Islands to explore the animals, birds, and marine species Charles Darwin wrote about; Baja, California, to examine gray whales, tubeworms, and other organisms that live off hydrothermal vents; and the Central American country of Belize to study the rain forest.

## An Interactive Curriculum to Return At-Risk Children to the Classroom

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Founded in 1977, Cities In Schools (CIS) is a nationwide network of local, State, regional, and national initiatives and thousands of dedicated individuals who contribute their time and talents to helping young people begin productive lives. It is the Nation's largest nonprofit dropout prevention program. CIS brings help directly to at-risk students by relocating community service providers to work as a personalized team serving alongside teachers in "CIS Academies"—freestanding facilities or wings within an existing school that are sponsored by an individual organization. Cities In Schools national headquarters and regional offices provide a wide variety of training, technical assistance, and support to local CIS programs.

All of CIS's core curricula are presented in a hypermedia training format, which utilizes the power of personal computers to combine full-motion video, slides, text, training manuals, group discussions, individual workbooks, and interactive exercises.

## A Public-Private Partnership that Encourages Students to Study Current Events

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During the 1994-1995 school year, each week WILX-TV, Lansing, Michigan, e-mailed to 400 teachers and students a pop quiz. The quiz included 10 questions about current, local, State, national, and international news reported the previous week either on the station's news program, or in a local newspaper or periodical. Students in grades four through eight who earned perfect scores on the quiz received a visit from station anchor Roger McCoy, and were presented with a TV-10 baseball cap, sweatshirt, or coffee mug.

The WILX-TV program was created by the station's general manager, Grant Santimore, with assistance from Roger McCoy. In initiating this program, the station intended to explore using the Internet system to expand its ties with students and teachers in mid-Michigan schools who had access to computers, modems, and the Internet in their classrooms. Their idea was to develop an educational outreach program that would help students and teachers learn more about contemporary news events, have greater access to the daily flow of information, and communicate more efficiently and effectively with the world outside the classroom.

Seven schools were selected to participate in the program. Each was provided with complimentary e-mail addresses and access to America Online. Over the course of the year, teachers and students used their complimentary America Online accounts to access thousands of daily, weekly, and monthly periodicals; the Internet; World Wide Web; weather information; educational software; downloadable software files; live conferences; message boards; and much more. In addition, they e-mailed questions to the TV-10 staff, the White House, the Governor, and numerous other people and places in the United States and around the world.

"Many students' parents have commented to me how their sons and daughters not only pay more attention to the news while preparing for the weekly quizzes, but spend more time discussing its ramifications with their parents and siblings. . . . A year ago, many of our students were hard pressed to talk in-depth about many of the most pressing news events. Today, most of them are not only tuned in to current events, they sometimes catch and correct my occasional wording errors in our News-10 Pop Quizzes." —*Roger McCoy, WILX-TV news anchor, Lansing, Michigan*

By using America Online services and computers, teachers report that students developed stronger independent learning skills when it came to finding information from the program's database. Weekly quiz scores rose dramatically over the course of the year, and both teachers and parents noted that students became more aware of contemporary news events and how they shaped their everyday lives because the quizzes encouraged them to spend more time watching news programs and reading the newspaper. WILX-TV is now expanding the program to other mid-Michigan schools and has recently launched its own Web homepage.

## Student Collaboration Through the Global Schoolhouse Project

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In 1993, students ages 10 to 13, from four geographically distant schools—Jefferson Junior High School in Oceanside, California; Cedar Bluff Middle School in Knoxville, Tennessee; Longbranch Elementary School in Arlington, VA; and Oldfield House School in Hampton, United Kingdom—met over the airwaves to discuss their findings in a collaborative study of the environment. The students were part of a demonstration of the Global Schoolhouse that occurred during the National Science Foundation's U.S. National Science and Technology Week.

The students' goal was to read *Earth in the Balance* by Vice President Al Gore and then conduct ground water pollution studies in their communities. They were given 6 weeks to complete the project and prepare for a videoconference with students from other schools to compare findings. Beginning 3 weeks before the demonstration, students met in 2 weekly videoconference rehearsals over the Internet to give progress reports and show video clips of their research.

The Global Schoolhouse was established to demonstrate how people and information resources on the Internet can be used as a classroom tool for research and as a medium for interactive collaborative learning.

In addition to its administrative and educational benefits, in a number of areas the Global Schoolhouse is providing community access to school resources. Some schools and network projects are encouraging parents to become involved and have offered access via dialup accounts to school systems. Homework assignment archives, schedules, calendars, lunch menus, etc., are just some of the things that can be made publicly available through this network. Additionally, teachers are more accessible via electronic mail for parent/teacher conferences.

Networked Information Discovery and Retrieval (CNIDR) staff provide ongoing training and support for the various Internet Networked Information Discovery and Retrieval (NIDR) tools and other software used by the project through workshops, onsite visits to schools, online real-time sessions with students using video conferencing, and audio conferencing.

Established in 1993, the Global Schoolhouse was funded in part by the National Science Foundation, as well as many local and national businesses.

Public libraries have a long tradition of cooperation, connectivity, and computerization that can be leveraged to facilitate connection to the Information Superhighway. The long history of library cooperation includes major programs such as the Online Computer Library Center, Inc. (OCLC) and the Research Libraries Information Network (RLIN).

Libraries' efforts in cooperation, connectivity, and computerization have been driven by a desire to increase access by individuals to the number and types of resources and services through online catalogs, CD-ROM titles, commercial online databases, electronic texts, and interlibrary loans. Providing public access connections to the Information Superhighway is a logical extension of these efforts because it allows any public library to improve access for the people it serves by providing a large and diverse number of sources in all formats and media from around the world. This also expands on libraries' long tradition of connecting libraries of all types and helps champion efforts to create community-oriented networks. As libraries move in this direction, the services they deliver will increasingly relate to the delivery and management of electronic content created and stored both locally and well beyond the library's four walls to other parts of the globe. Libraries have always played an essential public role by providing access to knowledge and information from a diverse range of sources and viewpoints. They have also served historically as part of the educational community, for example, working with school librarians to provide homework assistance to students. As a consequence, library constituencies will be from both the local community and the world at large. Some of the ways this Nation's libraries have sought to continue delivering these services and meet these missions while successfully entering and contributing to the Information Superhighway are described below.

## *Building the Foundation for the National Digital Library*

During its 5-year American Memory Pilot Project, the Library of Congress (LOC)—the Nation's library—digitized more than 20 American historical and cultural collections comprising 300,000 items, including prints, photographs, manuscripts, sound recordings, and early motion pictures. Digitized collections were tested in 44 libraries and schools across the Nation. Access to these materials led both educators and students—especially middle school students, to create a new environment for and attitude towards learning. Multiple subjects could now be taught with primary source materials created by Americans from both the recent and distant past. With this project LOC sought to "enrich the learning experience for K-12 youngsters, for adults striving to continue a lifelong dedication to learning, and, eventually, for researchers and scholars."

LOC is now expanding the pilot project, and seeks to digitize 5 million items by the year 2000, with 75 percent of the required $60 million development and sustaining funds raised from the private sector. To date nearly $20 million has been donated by the private sector.

The experiences of the National Digital Library, though not likely to be duplicated in scope, provide crucial insight on strategies and tactics for other institutions seeking to develop lifelong learning source materials.

The homepage of Libraries for the Future (LFF), a national nonprofit organization concerned with library issues, contains dozens of descriptions of libraries using computers and technology in innovative ways. LFF seeks to initiate and support grassroots efforts, demonstration projects, research, and public awareness of and by public libraries with an eye towards the future needs of the networked age.

"The library of the future must serve the entire spectrum of library users, from elementary and secondary students to university scholars, from the general reading public to the technical specialist, providing seamless access to all fields of knowledge."—*William Scholten, director, Center for Technology in the Public Library, Seattle Public Library*

## Seniors Teach at the State-of-the-Art Computer Lab and a Community Builds its Network at the Public Library of Charlotte and Mecklenburg County

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"Most of our best volunteers are over 60," says Robert J. Cannon, executive director of the Public Library of Charlotte and Mecklenburg County (PLCMC), headquartered in Charlotte, North Carolina. Such a statement might not be surprising, except that those volunteers are not simply helping patrons check out books or find reference materials; they are computer-literate and they are providing hands-on training on computer and communications skills in PLCMC's state-of-the-art Virtual Library.

PLCMC has also set up career centers that carry job listings and classified ad sections from all over the State and the Nation, plus the full range of education information.

PLCMC serves 570,000 residents and 3,000 nonresidents of the county, making it the largest library system in the Carolinas. It was named the 1995 National Library of the Year by *Library Journal* because of its outstanding service to the community, creativity, innovation in coping with the changing needs of its clientele, and leadership in creating programs that can be emulated by other libraries. Each year county residents pay $26.34 per capita to support PLCMC's nearly $15 million operating budget. In addition, they have consistently passed bond issues for the expansion of the library to meet demand from the growing population served (60 percent of area residents have library cards).

The Virtual Lab opened on April 3, 1995. Accessible to the entire community through equal access use policies, the lab showcases new information and communication technologies and offers a full schedule of hands-on workshop and training opportunities. Twenty high-performance workstations are equipped with more than 70 applications for drawing, animation, desktop publishing, scanning, imaging, multimedia, and full Internet connectivity. Patrons gain free access to these workstations either by scheduling time in advance in 2-hour blocks or as walk-ins with a 1-hour time limit. Also available are more than 200 CD-ROM titles on topics ranging from science to history to art to music.

Charlotte's Web had its inception through a group of local citizens who approached PLCMC and the Central Piedmont Community College for institutional support. Steve Snow, an early partner in Charlotte's Web notes that "the library partnership offered a metaphor that people could understand. We had a terrible time explaining what we are trying to do. . . . [Partnership with the library] redefined my idea of a library as a convener of the community rather than just a depository of information."—*Source: Libraries for the Future homepage.*

PLCMC also directs "Charlotte's Web"—a regional community computer network. Charlotte's Web's vision is to ensure that all citizens in the area have access to education information and communications resources to help make the region a better place to live, grow, and prosper. Since June 1994, Charlotte's Web has provided 7-day-a-week access to a wide range of information and communication services and resources. Content is often created by local organizations that have been trained by Charlotte's Web staff to electronically publish their information, which gives them a stake in the network as well as a responsibility to keep their content offerings current.

Local dial-ins into Charlotte's Web jumped from 1,149 in January 1995 to 9,300 in September 1995, and the average user online time has nearly tripled. Access to

Charlotte's Web is also provided through 74 public access terminals located at local library branches, neighborhood youth and senior centers, school classrooms, school libraries, health care facilities, and shelters. A User Agreement and Acceptable Use Policy includes statements on topics such as intellectual property protection, systems security, intellectual freedom, and assisting and guiding users on appropriate usage.

Startup funds for this project came from a $450,000 Department of Commerce/ NTIA TIIAP matching grant, as well as other State and local funds. Charlotte's Web depends heavily on the efforts of scores of volunteers who do everything from clerical work to training to systems programming to content management to repairing donated computers for placement back into the community.

## Maryland Libraries Go Online with Sailor™

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The Division of Library Development Services (DLDS) at the Maryland State Department of Education, the University of Maryland, and the Enoch Pratt Free Library collaborated to create Sailor™ Telecommunications Network—a statewide telecommunications infrastructure that connects and provides access through public libraries. Marylanders and others can gain access by dialing into the network through hundreds of terminals at local libraries—it has already been integrated as a menu item in public library online public access catalogs—by dialing through a local public library connection, or through the Internet. By the end of 1995, when every county will be connected to the network, all 4.8 million residents in the State will be served through local phone access.

DLDS provides full-time staff to coordinate the project and plays a crucial leadership role for the State library community. The University of Maryland provides essential technical expertise and resources such as servers and modem pools, and the Pratt Library hosts and supports the Sailor Operations Center. Sailor's successful collaborations are partly attributable to the creation of an implementor's group and task groups. Approximately 50 public, college and university, school, and special libraries from across the State provide volunteers to these working groups.

"Sailor's primary effort is to build an intelligent, organized and useful [resource] that will enable users to get to resources that will meet their information needs."—*Sailor™ project manager, Barbara G. Smith*

Publicly accessible since July 1994, Sailor™ provides Marylanders with access to local and State information and Internet resources. Access can be achieved through local libraries, schools, homes, offices, and even prisons. It will soon be available also in public kiosks, in shopping malls, and in Baltimore's trendy Inner Harbor. Marylanders are making use of Sailor™ in droves—over a 7-day period in September 1995, the network was accessed 148,000 times. At any given time an average of 158 people are using Sailor™.

Information about State government, cities, counties, communities, libraries, and education resources, as well as subject-oriented information on a wide range of topics, is available through the network. Some links within this classification scheme are to the Maryland Poison Center; the Maryland Education Technology Network; a job hotline; a State guide to divorce laws; and the Regional Child Care Referral. A "free space" encourages Marylanders to share information they feel would be of interest to others in the State, such as meeting announcements and newsletters (advertisements and appeals for money are prohibited).

Across the State, the network has stimulated and increased the breadth of library automation. Sailor™ has also improved the speed and range of reference services by integrating print and electronic resources to handle patron queries, through online demonstrations, and by offering training classes. Several library systems across the State are working with county and city government to post their information and to offer their services electronically. Sailor™ also is a partner in the State's effort to build the Maryland Electronic State, and is providing public access to the World Wide Web homepages that State agencies have recently been required to develop. In addition, many school systems are beginning to integrate Sailor™ into their curricula.

Initial funding for Sailor™ came from a Library Services and Technology Act (LSTA) grant under the Department of Education's Public Library Construction and Technology Enhancement program. The network has been implemented by Maryland librarians and volunteers. A master trainer program is helping librarians across the State learn about the system and how to teach others to use it. Libraries themselves are providing one-on-one training, as well as sessions, to members of the public—including school faculty and students—who wish to learn about the system.

## Getting Patrons on the Internet, Reaching Out to the Community, and Developing Community Information Resources

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The Seattle Public Library (SPL) has provided public access to the Internet—via a leased line to a commercial Internet provider—and electronic community information databases and resources since July 1993. During 1995, it witnessed nearly 5 million user transactions and 1 million public connections to the Internet. These transactions and connections were made through 24 public access sites throughout the city and via remote dial-ins. SPL specifically works to target patron groups that might not otherwise have access or make use of the available content—senior citizens, downtown homeless people, teachers and students, parents of home-schooled children, job seekers, arts and social service organizations, African-American service organizations, and visually impaired persons.

SPL's 200 public access terminals are available in 20 neighborhoods and 2 housing projects throughout the city. It is the first public library in the Nation to provide such extensive free public access to patrons. In addition, SPL has provided extensive small-group Internet training sessions for more than 2,000 patrons, ensuring that the public terminals don't lay idle. SPL staff also conduct outreach to senior groups, community-based organizations, job fairs, and other forums to teach about practical and relevant Internet applications. Thousands have gained access to and experience with the information network as a result.

A homeless man, self-described as a "homeless hacker," became so skilled in using SPL's online network that he was invited to interview with a company in Los Angeles. The company hired him on the spot as a contract programmer and arranged housing for him.

SPL is also developing and guiding Seattle-specific content through construction of a database of community organizations, a "Seattle Facts" database, and a calendar of community events. The database of community organizations has become a "virtual Rolodex of Seattle," with information on social service and arts groups, government agencies, clubs, and other community resources. The electronic version is now twice as large as its print predecessor. In addition, the SPL program provides access to the Washington State Legislature Public Access System, the City of Seattle Public Access Network, the city's geographic information system, other important local community documents, and Federal databases. This electronic resource is used far more than its print correlates had been.

SPL's recently established Center for Technology in the Public Library—an R&D institute dedicated to applying information technologies to public libraries—put the Information Superhighway in the hands of Seattleites today. SPL also provides—with permission—an excerpt from the brochure "Child Safety on the Information Superhighway," from the National Center for Missing and Exploited Children. The document gives guidance on youth safety precautions associated with computer networks, such as protecting youth privacy, parental control, and disseminating and receiving personal and other information over networks.

> "The new environment of sharing access to information across institutional barriers requires a new mindset and readiness to work in partnerships and collaborations. We have made progress we never could have achieved without these alliances."—*Source: SPL's entry application for the 1994 National Infrastructure Awards.*

> "In some areas of our service, the traditional model of acquiring, maintaining, and housing printed information for its eventual use is being superseded by a system that shares, organizes, and delivers needed information on demand from anywhere in the world."—*Source: SPL's entry application for the 1994 National Infrastructure Awards.*

## Patrons Learn Usage Responsibilities and Help Build the Community Freenet

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The St. Joseph County Public Library (SJCPL) became the first publicly accessible Internet connection for public library users in Indiana in March 1994. It is also giving patrons important information about their responsibilities in using the Superhighway through a computer usage policy that describes what is acceptable use for both computer networks and standalone workstations—including confidentiality, user responsibilities, legal use (including copyright), ethical use (including security and privacy), cooperative use, sanctions, and liability. It has also developed an Internet usage policy, posted at each public access terminal, that guides patrons on staff assistance, time limits, printing, and downloading.

Library staff received 7 months of training before Internet-accessible terminals were made available to the public—administrators believed it would have been inappropriate to offer public access until library staff were adequately trained and prepared to handle queries for technical and informational assistance. A program of public instruction began in March 1995.

Partners include the library, the University of Notre Dame, and CicNet, a not-for-profit Internet provider for the northern Midwest States. In one component of this partnership, the library was able to leverage the talents and labor of a Notre Dame student in setting up its World Wide Web server and pages.

The library's Web pages provide access to SJCPL branches, local high school homepages, and several databases including: an online catalog from three area public libraries that contains more than 500,000 bibliographic records; *Community Connection,* which provides information on more than 1,200 community organizations and services; an index to abstracts from the *South Bend Tribune*'s metro section; a monthly events calendar; detailed information on each State Senator and Representative; a magazine and newspaper subject guide; Infofile, a database of common reference questions; and a database of more than 320 libraries across the globe that provide resources and services over the Internet. Public access is currently available through six terminals at the library's main branch and a single terminal in each of its seven branches.

The library is also a partner, host, and initiator of the Michiana Freenet, which serves the greater South Bend area, Elkhart, Indiana, and lower Michigan—the first freenet in Indiana. Community groups contribute content by bringing information in machine-readable form, which SJCPL then loads onto the freenet. For example, the Health Communities Initiative link provides information on a program created by 100 community stakeholders who developed an action plan for a community-based health "building" system based on "understanding, collaboration, consensus, a long-term perspective, and common strategies."

Funding for St. Joseph programs has come from a combination of internal and external sources. Startup costs totaled $10,000, and ongoing costs include $237 per month for the leased line and $4,500 per year for network maintenance. MCI recently donated $53,000 to the freenet project.

## Building an Electronic Information Network

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In early 1995, the Carnegie Library of Pittsburgh, the Commission on the Future of Libraries in Allegheny County, and the Allegheny County Library Association developed the Electronic Information Network (EIN) Project. The project seeks to link Allegheny County's 46 public libraries to each other and to the Information Superhighway, and thereby provide county residents with equalized access to information through an online catalog of 3.5 million items; a countywide library card that can be used in any facility; public workstations, remote access, and a local infrastructure to support access to the Superhighway. EIN's goals include equitable access to electronic databases, Internet connectivity, enhanced resource sharing of library materials, interconnections between automated systems of libraries in the county, and continuous training on network and other electronic systems and services.

The Three Rivers Freenet (TRFN) was developed with a Library Construction and Services Act grant. Primary drivers of TRFN have been the director of the Carnegie Library of Pittsburgh and two faculty members at the School of Library and Information Science at the University of Pittsburgh (SLIS). The library director saw the freenet as a means of updating the traditional role of the public library. The faculty became involved because they were interested in creating a "living laboratory" where students can experience the networked environment in which they will work. As a consequence, SLIS provides in-kind contributions in technology and services to identify, load, and manage the content of the freenet. In addition, each of these drivers believed that TRFN could stimulate community economic development by providing information on local business opportunities and providing information about business to businesses. Other TRFN stakeholders include the State library, which provided 2 years of startup funding, private organizations, the city, the county, the Regional Asset District, and the Commission on the Future of Libraries in Allegheny County.

TRFN is a place for local community organizations and institutions to provide public service information, and provide county inhabitants with the opportunity to obtain gateway access to the Internet. Some of the information currently or soon to be made available on TRFN includes calendars of events, local weather, local government information—notices, council minutes, phone numbers, and voter information—bus schedules, city guides, movie and theater listings, restaurant reviews, and consumer health information.

TRFN's success is attributable to three factors: people in leadership positions in the city public library realized that the library had to change to remain relevant to the community and that part of this change required broad and intelligent use of information technology; leaders from SLIS believed that the school should play a more visible role in the community and also prepare its graduates to successfully enter the emerging networked age; and national publicity achieved by other cities that developed freenets served as a wake-up call to action. One participant contends that nothing would have occurred had it not been for the proactivity and support of the public library trustees and library director, realizing that the freenet was an important and crucial endeavor.

## Professional Training and New Partnerships at the Utah Library Network

A few years ago the Utah State legislature provided funding to the Utah State Library Division to coordinate public library connectivity to national and international networks. The access provided through the Utah Library appears to be fostering a new equity between rural and large urban public libraries. Resources available on the Utah Library Network (ULN) include electronic catalogs, indexes, full-text periodical and newspaper databases, interlibrary loans, and local, State, and Federal databases. Since 1993 it has provided daily updated legislative information. ULN was a 1995 National Information Infrastructure winner in the government category.

The Utah State Library has championed the project and also oversees database licensing contracts for the network and training for librarians, and provides connectivity matching grants to individual libraries. A central planning group was essential in bringing together librarians from across the State and from a wide assortment of library types to discuss information and service priorities, mutual interests and needs, and ways of cooperatively developing complementary databases. This collaboration has given each participant a window to the collections, activities, interests, and human resources of other institutions across the State. A training manual was created and integrated into a program that has so far trained 110 librarians. ULN firmly believes that ongoing professional training will be a fact of life and that institutions will need to invest both time and money to allow employees to learn and use new tools effectively.

Local partnerships were essential for creating informed and useful local connectivity. Unprecedented partnerships were developed between libraries, local governments, schools, and businesses to share connectivity and other infrastructure costs. Stakeholder collaborations succeeded best when there was a recognition that network access was a win-win situation for all participants.

Critical success factors identified by the ULN of use to other communities include: local technical expertise; introductory, advanced, and trainer training; time to learn; a positive attitude; and strong local leadership. Primary obstacles have been overcoming attitudinal and managerial barriers; managing the information resources available on the network; finding time to train, retrain, and use the network; and solving thorny policy issues such as what to charge and what to provide access to. Other challenges faced included convincing libraries and other stakeholders to participate, figuring out how to connect libraries and configure hardware, deciding what to place on the network, how to navigate within it, and remaining persistent in solving "a hundred and one problems" never before encountered.

The benefits, though, are many. In one small instance, an individual found information online that he shared with his dentist to solve a serious dental problem no one could figure out.

Utah State Library Division
2150 South 300 West, Suite 16
Salt Lake City, UT 84115
Tel: 801-466-5888
Internet Access: http://www.state.lib.ut.us/

## MUSEUMS

Museums, because they often specialize in different facets of science, technology, history, culture, and the arts, are rich resources for young and old. With the exception of those who live in the Nation's largest cities, however, most communities have only one small, or no museum for their residents to visit. Increasingly, the Information Superhighway is giving Americans young and old the opportunity to enjoy and learn from the vast collections of art, technologies, and other artifacts of society housed in the Nation's museums. A few of the museums and collections that have gone online, or are devoted to showcasing Information Age technologies are described below.

## Learning Online Through The Exploratorium

Want to dive into the gene pool and explore genetics, learn about the bombing of Nagasaki through a photographic exhibit and discussion, or leaf through a digital library of online exhibits, scientific images, and sounds? For teachers who have Internet capabilities in their classrooms, these exhibits have been just a click on The Learning Studio location of the World Wide Web.

The Learning Studio is a multimedia and communications lab operated by The Exploratorium—San Francisco's renowned, hands-on museum of art, science, and human perception. The Exploratorium's more than 650 interactive exhibits draw more than 660,000 visitors—67,000 children on field trips—and trains more than 500 teachers each year. It operates in partnership with local government, the higher education system, and the private sector. During the second week of August 1995, The Learning Studio's Web site had more than 150,000 accesses.

The Learning Studio provides multimedia and communications training for science educators and will be opening to the general public shortly. It is part of the Science Learning Network (SLN), which is funded by the National Science Foundation and Unisys Corporation and part of the Web resources forum. Using The Learning Studio's Web page: teachers can learn how to build classroom/home versions of more than 100 Exploratorium exhibits; review a guide to student-built experiments, written by teachers for teachers; and find other science sites on the Web.

The Exploratorium
3601 Lyon Street
San Francisco, CA 94123
Tel: 415-563-7337
Fax: 415-561-0307
Internet Access: http://www.exploratorium.edu/

## Teaching Children about Computers Through Boston's Computer Museum

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The Computer Museum of Boston is an independent, nonprofit institution where people of all ages and backgrounds can see how computers have touched all aspects of modern life, from business to education to health to entertainment to art. Its mission is to educate and inspire people on the evolution, technologies, applications, and impact of computing through dynamic interactive exhibits and programs. The museum is unique in that it is making special efforts to reach children from underserved communities and provide them with the resources needed to develop their talents, contribute to their community, and pursue fulfilling employment. Each year it has more than 135,000 visitors.

Among the museum's many exhibits and attractions is the Computer Clubhouse—an afterschool program primarily focused on youth from underserved communities—where visitors develop computer-based projects. Youth ages 10 to 16 work on projects with mentors using professional-level software to design computer graphics, robots, video games, interactive newsletters, music, science simulations, and multimedia presentations and animations. Some of the specific projects include: Continuum; a group of minority teenagers who are building family trees on the Web; a workshop for girls to work with women to learn and create; and the Clubhouse animation studio, where computer-generated 2D and 3D animation and cartoons are created. The final products are shown on Boston's cable access channel; and at an online art gallery, where computer-based works of art are shown in a virtual gallery accessible over the World Wide Web.

The museum has published a *Guide to Best Software for Kids* and maintains 170 interactive exhibits, including: Networked Planet, a new gallery on the Information Superhighway, which was a finalist in the 1995 Computerworld Smithsonian Awards; a walk-through computer; a multimedia robot show; and an extensive collection of computers and robots.

The Computer Museum is funded by a broad spectrum of corporate and individual donors, museum admissions fees, and foundation and government grants.

# Learning Cultural Heritage in the Getty Art History Information Program

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getty.edu/

The Getty Art History Information Program (AHIP) works to enrich the content of computer networks of the future by encouraging persons concerned with preserving the cultural heritage to collaborate in building a cultural information infrastructure. The opportunity to link databases of information, a long-awaited development, is now at a critical juncture. The idea of synergy among institutions that wish to share information is becoming a reality and AHIP is focusing attention on issues and policies to make humanities and arts information a powerful part of the Information Superhighway.

AHIP plays a catalytic role to build consensus on key issues, identifying and bringing together stakeholders, and provides leadership for the research and development process needed to establish connections between people and their cultural heritage. AHIP works to evolve and establish crucial standards to guarantee the preservation of information and ensure that it will be accessible on the networks of the future.

The AHIP initiatives include a vast array of projects and programs. The Network Access Project promotes access to cultural heritage information by mobilizing the cultural sector to create and distribute relevant information. It is currently formulating a research agent for cultural heritage on information networks, which is designed to build consensus on critical technical issues and propose solutions for them.

Representatives from interested cultural heritage communities work together to develop open systems built on a solid foundation of standards. AHIP's experience and interests equip it to play an essential catalytic role, helping those who value the arts and humanities to be ready to take advantage of the possibilities offered by this new age.

AHIP programs receive support through the Department of Commerce/NTIA's TIIAP grants.

## COMMUNITY CENTERS AND THE NETWORKS COMMUNITIES BUILD

Community centers are an excellent adjunct to schools and public libraries in meeting the needs of a community and providing public access to the Information Superhighway. Connecting community centers can fulfill the access needs of the adult population of a community; can extend the hours when the Information Superhighway is available to the community; can bring the community closer together as citizens create electronic bulletin boards, homepages, etc., that address specific needs that are not filled by schools and libraries; and can create a point of access for "special interest" groups within a community—senior citizens and veterans, for instance—who would not otherwise have access to the Information Superhighway. Connecting community centers can also allow access to the Information Superhighway for specific types of communities—the Native American community, for example—that would not otherwise use or have access to public schools or libraries.

For the purposes of discussion, a community center is defined as a physical location where community members go to meet others, learn, play, receive social services, or access both print and electronic resources. This definition encompasses a broad range of locations, including government offices (city or town halls), public institutions (post offices or municipal recreation departments), cultural or religious centers (churches or ethnic centers), and centers for at-risk populations (public housing projects or boys/girls clubs). Even privately owned shopping malls, banks, museums, and grocery stores can be regarded as centers where communities meet and, in fact, have already been targeted as test sites by several community networking efforts. In addition, electronic community centers have been established in the form of online community bulletin boards, chatlines for selected communities-of-interest—for example, LatinoNet, SeniorNet, Alzheimer's Disease Network—and/or homepages and databases for community organizations. In the broadest sense, a community could seek to be "wired" by connecting a range of physical community centers as well as creating electronic communities that connect individuals or groups to each other and to community resources.

## One in Ten Go Online in Taos

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Since December 1994, more than 1,000 residents of the small multicultural rural community of Taos, New Mexico, have joined the Information Superhighway—1 in 10 residents has gone online in a community where the per capita annual income is only $9,300 and only 60 to 65 percent of the population has a telephone at home, and that number is growing every day.

La Plaza was the first community network to access the Information Superhighway in the State of New Mexico. It is state-of-the-art, providing access to a wide array of information and communications resources to all Taoseños and other Northern New Mexicans, regardless of physical disability, economic status, cultural identity, age, or degree of computer literacy. Everyone in the region can use the network through public dial-in access. Persons who lack computers and modems can obtain 15 hours of free time each month through one of 56 terminals in the La Plaza center, located at the University of New Mexico, Taos. At the center, a La Plaza staff member is available from 9:00 AM to 9:00 PM every day to help anyone with technical questions or information needs.

Today, community residents—ranging from grade-school children to octogenarians, Taos Pueblo Indians, Hispanics, and others—are using this network for such activities as: school work; to enhance educational opportunities; to visit a virtual library, an online art gallery, and an online art museum; to look for jobs, obtain assistance on how to prepare resumes, and learn how to interview; to obtain information on prenatal care, AIDS, diabetes, emergency health care, and on other medical issues; to learn about regional history and folklore; and to keep up with events in the community.

To date, La Plaza has engaged in a number of successful, mutually beneficial joint efforts and received funding and equipment from a number of sources. It enjoys extraordinarily good relationships with the educational institutions in the Taos region, the Taos Public Library, government entities, health care providers, local museums, and the business community.

From the beginning, a close working relationship was developed with the University of New Mexico-Taos Education Center. Under a memorandum of understanding, UNM-Taos provides physical space for office and equipment, utilities, copying and other support services, and early on it provided a telephone line for the project. In return, La Plaza provides technical expertise, including setting up the UNM-Taos' internal network and LANs for the computer laboratories—and has trained university faculty, staff, and administration in the use of the Internet. La Plaza personnel also teach specialized workshops for individual groups, such as science and math teachers, other teachers in other disciplines, and the business community.

Financial and in-kind support has come from UNM, the Town of Taos, the State, Federal agencies, local business, and several large corporations. In July 1995, La Plaza was named by NII Awards as one of the top six community projects on the Information Superhighway, and nearly every day new capabilities are added. New Mexico will soon replicate this project in 20 cities across the State.

## Luminet—A Small-Town Network with Big-City Capabilities

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In 1993, a small community in Minnesota—population 30,000—had a big idea. The community wanted to connect its government, health care, business, and K-12 and postsecondary education institutions with interactive voice, data, and video communications. Winona community leaders believed that such a network would provide, among other benefits:

- Parents, teachers, students, administrators, community leaders, government officials, and business people with a means to collaborate in a virtual learning environment anywhere in the community;
- The school district with the means to deliver a multitude of applications to the community to support the idea of learning, not as a geographic place, but as a social and cognitive one;
- Means for enhancement of curriculum and staff development as well as the redefinition of the roles and instructional opportunities for teachers, students, and the community;
- More learning resources—including distance learning opportunities, and more information on demand that both engages and empowers students; and
- Means to make home and workplace connections that encourage lifelong learning and technological literacy, which in turn encourage economic progress.

To test the validity of their assumptions, the community conducted a feasibility study. To obtain initial funding for the project they looked to the Hiawatha Education Foundation, which committed $600,000 in seed money. Minnesota's Board of Government Innovation and Cooperation also awarded a grant on the basis of the proposed network designed, which focused on human and government services.

Luminet, the name chosen for the Winona network, formally came into being in December 1993, and is being implemented in three phases. During phase one, nine sites, including postsecondary and secondary educational institutions, local government, and a health care facility were interconnected. In phase two, a full fiber optic ring that extends around Winona to include elementary and middle schools, the library, and business is being installed. In phase three, the feasibility of bringing broadband and multimedia capabilities into homes is being explored.

Luminet's principal purpose is education for both traditional and nontraditional users, including business and industry. Thus, the network is applications driven and designed to address identified needs, such as sharing resources of time, talent, and technology, providing opportunities for professional collaboration on a global scale, fostering experimentation with new teaching/learning methods, lowering the costs of education and training, enabling all Winona institutions to access each other, removing regional barriers for information access, developing community groups to encourage enduser participation, identifying ways to create "knowledgeware," and developing new applications that can be shared within the region and around the world.

## Community Networking via Broadband Cable

Glenview, Illinois
Internet Access: http://www.glenview.lib.il.us/

The 30,000 residents of Glenview, Illinois, a suburb on the north side of Chicago, are now enjoying access to Information Superhighway resources, including online public catalogs of all public libraries, through a local television cable network that links schools, libraries, local government agencies, and other organizations to each other, and to the Internet via a high-speed network.

Planning for the communitywide network began several years ago. A number of civic committees and organizations were aware of the potential of network connections and were eager to find a method of interconnection.

The head of the public library wanted to see his institution make use of Internet resources. A school superintendent wanted a more reliable mechanism than the phone link to a public bulletin board system in Chicago then run by hobbyists. Administrators at other schools in Glenview were discovering the resources available on the Superhighway. The Glenview Schools already had extensive building networks and equipment in their buildings that provided the raw material for interconnection.

The breakthrough came with the discovery of a separate two-way cable system in Glenview that had lain fallow for 10 years. Engineers found it possible to restore this unused cable system to working order quickly and easily. This discovery made the cost of communitywide interconnection fall within reasonable limits. Three local organizations committed to share the cost of interconnection and maintenance, and Glenview's community network was soon up and running.

**'I firmly believe that the Internet, e-mail, Net News, and the World Wide Web's ability to present virtually all types of printed documents in an easy format will be as important a watershed in the history of mankind as was the development of the printing press."** —*John P. Mundt, former head of administrative computing, Glenview School District 34*

## Community Coalition Builds a Local Network

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Clark County, Nevada, is one of the fastest growing communities in the Nation. The county school district covers more than 8,000 square miles—including the City of Las Vegas and vast rural areas—and serves 166,788 young people through 127 elementary, 27 middle, 24 high, and 6 special education schools. In the past, county size and diversity have made equitable dissemination of information and services between schools, local government, and human resource providers such as United Way of Southern Nevada, difficult, if not impossible.

Because of the challenges presented by rapid growth, the Clark County Public Education Foundation, under the direction of its executive director, Judi Steele, is looking to the Information Superhighway as a cost-effective means to improve academic achievement levels, solve challenges of inequity of educational resources for students in the rural and urban sectors of their community, and develop a collaborative partnership among businesses, schools, and the United Way of Southern Nevada.

Founded in 1992, the Clark County Public Education Foundation created InterAct™—an education and community resource network. The foundation is an independent, nonprofit corporation created by business and community leaders to mobilize the community to support public school projects and initiatives to improve student performance and prepare students for the 21st century. Since then it has raised more than $6 million from the community for those purposes. The Department of Commerce supported the effort with a TIIAP grant.

To implement reforms, the foundation created an alliance of the home, school, and business communities that included school board members, school administrators, teachers, parents, students, and representatives of the business community. This group developed a plan, built a consensus for that plan, and engaged in collaborative problemsolving to create a computer network that would serve all members of the community. The United Way of Southern Nevada partnered with the foundation to bring community resources information to educators and distribute school information to the community. The United Way also marshaled additional community support from such groups as the Nevada Association for the Handicapped, Center for Healthy Families-Sunrise Hospital, Catholic Charities of Southern Nevada, Howard Cannon Senior Center, University of Nevada, Las Vegas, and other community agencies.

Recently, InterAct™ created a global village partnership with the Milton Keynes Community Network in Milton Keynes, United Kingdom. Through InterAct™, teachers, community members, and students are able to share ideas and resources, promote international cooperation, and discover the wonders of different cultures.

Community leaders believe that the rich cultural diversity of the community and the unique collaborative perspective that participating organizations bring to this project is a key factor in the overall success of this venture. The diversity of the coalition ensured that the network maintained a productive edge, always reflecting community needs.

## Bridging Cultural and Technological Barriers to Unite a Native American Nation

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The Navajo Reservation covers 25,000 square miles in Northern Arizona, Western New Mexico, and Southern Utah—roughly the size of West Virginia. Its population hovers around 225,000, the majority of whom raise sheep, horses, and cattle, and live on the open range in hogans, trailers, and mobile homes. Medicine men and women perform healing ceremonies for the ill, despite the availability of modern hospitals and physicians trained in Western medicine. Computers, and for the most part, the people who sell them, are not a part of this world.

Devising a plan for wider access to computer technology within the Navajo Nation has required addressing cultural and religious beliefs of the Navajo people and achieving a strategy to coordinate the use and development of computer technology that respects tribal songs and prayers. That has meant helping the Navajo people understand that the machines are a key to bringing myriad affirmative benefits to the Navajo Nation such as improved health care, education, the tribal court system, and administration of law enforcement and child welfare programs.

In addition, it is being used to: provide grassroots training and organization; help build communities and get community members involved in such activities as lobbying for building a new library; develop an overall information strategy to achieve distributed processing of financial transactions to the agency and chapter levels of the Navajo Nation Government via computer technology; allow for agency and chapter access to various Navajo Nation Government data and information via computer technology; and allow for agency and chapter access to the Internet.

Although substantial effort has been required to get the network off the ground—many members of the Navajo community live and work in remote sites in New Mexico that lack telephone access—currently, the network can accommodate 500 to 600 users simultaneously and includes six public access points. Funds and other support for the project have come from the Bureau of Indian Affairs, the Indian Health Service, the University of New Mexico, Gallup, San Juan Community College, and the Department of Commerce/NTIA's TIIAP grants.

## Making Healthy MUSIC

MUSIC
New Community Corporation
Newark, NJ
Tel: 201-484-0096

Residents of New Community Corporation's housing in Newark, New Jersey, whose children attend Newton Street Public School, are now linked by an electronic network that puts them in communication . . . with each other. The purpose of the network is to improve student achievement by improving the delivery of primary health care. Additionally, the program introduces people to and teaches them about computer information technology.

The most popular discussion groups on the network are Circle of Brothers, Circle of Sisters, About AIDS, and Parenting and Housekeeping. One woman who lost her son, daughter-in-law, and granddaughter to AIDS hosts a discussion group on AIDS. She is committed to educating the community about the importance of avoiding HIV infection and considers the discussions a form of therapy to deal with her grief.

The community database is designed on the metaphor of a house with many rooms. Neighborhood captains have . . . music, writing, etc. The project is working to empower community residents to overcome their lack of transportation, concerns about confidentiality, and apprehension about discussing health problems.

Funds for the Newark Public Schools project come from the U.S. Department of Commerce/NTIA's TIIAP grants. The project links residents' homes with New Community Corporation and the New Jersey Medical School, i.e., University of Medicine and Dentistry of New Jersey, the two partners of the Newark Public Schools in the program—along with Rutgers University, Newark Public Library, *The Star Ledger*, and other agencies.

## Community Wide Education and Information Service

Community Wide Education and Information Service (CWEIS) is a program through which public broadcasters have been instrumental in establishing community computer networking projects across the Nation. CWEIS projects develop and encourage free and universal public access to education and information online services. Public radio and television stations across the county participate.

Community Wide Education and
Information Service (CWEIS)
National Public Radio
635 Massachusetts Ave., NW
Washington, DC 20001
Tel: 202-414-2000
Internet Access: http://www.cpb.org/cweis/cweisz.html

For example, KQED-FM and KALW-FM (with their public television counterparts) are involved in a San Francisco–based computer network project called "San Francisco CityLink Bridge." These public radio stations and their educational and civic partners established a central Web site that aggregates information about community resources. It provides access to the San Francisco Public Library, local elementary and secondary schools, the California Department of Education, local institutions of higher education, public broadcast information, State, Federal, and international government resources, and information on health and social services available from the City and County of San Francisco.

The system is designed to meet a variety of needs through a network of different access points. School children can access the central Web site from computers at their schools or homes to get help with their math skills, or even learn how to dissect a frog. Visitors can look at the Web site for maps, restaurant recommendations, and travel arrangements.

For persons without access to a computer, the city's public libraries offer free community access. Through these information kiosks, homeless persons can access the city's Department of Human Resources online publications on "How to Get a Job in San Francisco" or "Permanent Job Opportunities." The online information is supplemented by programming on government access cable channels, as well as programs on public broadcast stations.

One of the unique educational experiences that visitors to the San Francisco CityLink Bridge site have access to is National Public Radio's (NPR) Science Friday Kids Connection program (SFKC). KQED-FM (a participant in both projects) has joined with Luther Burbank Middle School and NPR's Science Friday and its scientists to make science education fun for middle school students. KIDSNET, the only national nonprofit computerized clearinghouse devoted to children's television, radio, audio, and multimedia, is also a sponsor of the project.

The program involves seven NPR member stations and a local school in each station's service area. Using a variety of broadcast, Internet, print, and hands-on resources, the students are working with Science Friday scientists to develop exciting and challenging science projects.

These and the rest of the projects in the partnership will culminate in a special Science Friday broadcast in spring 1996.

## Neighborhood-Based "Family Rooms" Benefit a Community's Low-Income Residents

United Neighborhood Houses of
New York, Inc.
Information Technology Initiative
Office
6 Metrotech Center, Room 152
Brooklyn, NY 11201
Tel: 718-643-3252
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Over the years, unemployment and poverty have been common in the settlement houses of New York City's Lower East Side. Today, United Neighborhood Houses of New York, Inc. (UNH) is attempting to better the lives of residents of these houses through an initiative that improves the delivery of integrated human services and enriches recreational, cultural, and educational activities. Use of the Information Superhighway is at the heart of this initiative.

As a result of this initiative, every settlement house now has a "neighborhood-based family room"—a place where multimedia computers and Internet access community residents can learn computer skills and access telecommunications-based resources for job and referral services. And, as Nancy Wackstein, executive director of Lenox Hill Neighborhood House in Manhattan reports, these family rooms have become ". . . a first point of contact for people with problems in our neighborhood. . . . [M]aking Internet access available greatly magnifies the information resources that we bring to bear when residents of our community come to us for help. For example, one early participant in our computer program was able to use the Internet to get information about cancer support groups when he learned that he was suffering from the disease."

"Community residents are coming to the family rooms because they perceive that they need computer training to get a better job and they are excited about being able to get the training in the neighborhood."—*Shella Martin, University Settlement's development director and liaison to the United Neighborhood Houses of New York project*

Settlement house family rooms have also been used by teens in the Summer Training and Employment Program (STEP) to produce their own newsletter, an afterschool program for at-risk youth, adult literacy classes, a Saturday program where parents and their children use the computers together, and numerous other activities for groups and individuals.

UNH is a nonprofit agency supported by the Department of Commerce/NTIA's TIIAP Program.

## Project DIANE—A Diversified Information and Assistance Network

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In Tennessee, children and disadvantaged youth are seeking and receiving guidance from senior citizen volunteers, the hearing impaired and others are attending sign language seminars and deaf culture workshops, and teenagers are interviewing with admissions officers at Tennessee's State University and applying for summer jobs—all through the videoconferencing facilities of the Diversified Information & Assistance Network (Project DIANE).

Project DIANE is a nonprofit, community-oriented network developed to provide communities and schools with information resources and professional expertise for education, community service, and small business development. Since 1992, it has helped to equip, recruit, and train teachers, scientists, librarians, community workers, business counselors, and other public service providers to use emerging information technologies. Currently more than 12,000 children and adults from educational institutions, community service organizations, economic development agencies, businesses, and communities in Nashville, as well as other parts of the country, are making use of the network.

To date, DIANE-based programs and applications have included: distance learning and tutoring, K-12 interactive remote field trips, distance mentoring, library reference services, children's story hour, interactive puppet shows, health care programs, small business counseling and training, language instruction, science and nature lectures, expert faculty consultations, computer software training, communication support for speech and hearing impaired persons, senior citizen assistance, and community-oriented applications. In addition to regularly scheduled activities, DIANE organizations also conduct special events ranging from workshops to community forums. Individuals and service organizations can use DIANE for such activities as:

- Conducting full-screen, two-way videoconferencing;
- Providing high-quality FM stereo-like voice communications;
- Transmitting multimedia information and jointly creating, editing, or annotating an electronic document or digital image;
- Watching remote VCR or laser disc video recordings;
- Sending e-mail; and
- Receiving stored or real-time information from satellite downlinks, local area networks, coaxial camera systems, or other interconnected external sources.

Users can access the DIANE network form 26 different locations. DIANE is an all-digital, dialup, wide area network. Interactive video and multimedia computer users connect locally to DIANE via local public telephone company ISDN circuits and to DIANE service centers in other cities via long-distance telephone company virtual private network services.

## REGIONAL AND STATE INITIATIVES

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### Businesses, Educators, Local Governments, and Citizens Join to Create a Smart Valley

One of America's most innovative, promising demonstrations of the power of community leadership is happening in Silicon Valley, California. Four years ago, faced with daunting challenges to the Valley's future attractiveness as a place to live and work, leaders from business, government, education, and community organizations decided to work together collaboratively to rejuvenate the Valley's economy and strengthen its quality of life. With that bold mission, they formed a new regional organization, Joint Venture: Silicon Valley Network. Its long-term vision is to build a community collaborating to compete globally.

Joint Venture launched a number of initiatives to pursue these goals. Recognizing the centrality of education and technology, two of these initiatives are the 21st Century Education Initiative, which is helping to bring about systemic change in K-12 education, and Smart Valley, whose mission is to help develop an electronic community.

Together, the Education Initiative and Smart Valley created Challenge 2000, a 5-year, $22 million effort, funded by corporations and foundations, to help build a world-class educational system that will enable all students in greater Silicon Valley to be successful, productive citizens in the 21st century. The Challenge 2000 coalition includes chief executive officers of major local companies, school superintendents, teachers, parents, and other community leaders who have joined forces to achieve systemic and sustainable changes and measurable gains in student achievement.

Challenge 2000 provides an opportunity to integrate the Valley's technology effectively into education. Successfully integrating technology into the learning process requires not only the right equipment, but also the right skills, institutional support, and clear objectives. Challenge 2000 provides technology only to schools that can clearly demonstrate how the technology will improve student learning.

In its first year, Challenge 2000, with assistance from the 21st Century Education Initiative, has selected four Renaissance Teams, representing 37 elementary, middle, and high schools serving 27,000 students in Silicon Valley, to receive financial and human-resources assistance to improve their educational processes. These "vertical slices" of elementary, middle, and high schools are working together, some for the first time, to give students an integrated continuum of world-class education.

Smart Valley is providing technical guidance for the effective use of technology in the schools. One of its projects is Smart Valley Technical Guidelines to help K-12 schools design a local and wide area network. The Guidelines leads schools through a decisionmaking process for the design of their networks.

The Smart Schools Resource Bank is assembling donations of hardware, software, and technical-support personnel to ease the financial burden of bringing technology to schools. With this technical capability, students, for example, can tap into libraries at Stanford University and San Jose State University; run simulations on supercomputers at Lawrence Livermore National Laboratory; and access scarce resources such as video materials and master teachers through two-way video links.

Another Smart Valley effort to connect people in communities to the Superhighway is a public access network. Sites are being opened in public libraries, city and county administrative offices, and retail outlets.

## North Carolina Information Highway

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The North Carolina Information Highway (NCIH) is an example of how one State is harnessing state-of-the-art broadband information technology as a strategic tool for economic growth and social welfare. It is the product of long-range planning and vision, cooperation between government and industry, and a commitment on the part of potential users.

In addition to social benefits in education, law enforcement, and health care, State planners believed that the NCIH would be a powerful economic development tool for both luring new business and encouraging existing business to expand operations. A March 1994 study by the WEFA Group, a leading economic forecasting firm, predicts that over the next decade, the North Carolina economy will gain $2.7 billion and 44,000 jobs because of the NCIH.

Planning for the network began in the 1980s and was fueled by the success of several testbed projects in the early 1990s, such as: Vision Carolina, a 2-year, public-private project that employed fiber optics to link 16 sites—high schools, community colleges, universities, and a medical center; and the Impact North Carolina project, which demonstrated the value of copper-based distance learning by linking Appalachian State University and nearby public schools.

NCIH will link more than 3,400 sites—public schools, hospitals, libraries, community colleges, universities, law enforcement centers, courthouses, prisons, and local and State government locations—in all 100 counties of the State. Implementing the network has required upgrading the State's public switched network to link the sites with the high-speed fiber optics cables and advanced ATM broadband switches and SONET transmission systems. Southern Bell, Carolina Telephone, GTE South, and the 24 other local telephone companies who are building the network will own and operate it as they have with the State's public switched network. The State serves as the network's anchor tenant.

The State is obtaining funds for the project from a variety of sources, including: local budgets and bonds, reallocating existing money at local and State levels; Federal and foundation grants; and new appropriations from its General Assembly, which in 1994 appropriated $7 million for a grant program.

A former North Carolina legislator once described the Tar Heel State as having islands of prosperity in a sea of poverty. State officials believe that the NCIH, once fully deployed statewide, will serve as a great equalizer of resources between urban and rural areas, and the wealthy and low-income residents. For North Carolina, the main benefits of the NCIH fall into four categories—increased efficiency, access to information, equity in education, and sharing of resources. On the surface, these benefits may appear abstract, but when applied to specific areas of society—government, education, crime control, health care, and economic development—North Carolina State officials believe they are clear and concrete.

## Hawaii Education Network

The people of Hawaii, dispersed as they are across eight major islands, have special reason to look to a future in which all learners are empowered to fully participate in the global village. This long-range goal dictates the State's pragmatic decision as it designs and implements an educational technology infrastructure that will provide access for all learners.

The effort to date includes local and statewide efforts. Locally, for example, more than half of Hawaii's elementary and secondary schools have begun installing the cabling needed for local area networks. Statewide, Hawaii has instituted a network (I-Net) that links 243 elementary and secondary schools, the University of Hawaii, and approximately 50 district and State offices.

Hawaii is extensively cabled for CATV, and indeed cable television is important to the State's education technology goals. The State's distance learning programs rely on several different technologies to provide connectivity, the State's microwave backbone, leased telephone lines, interactive video between islands, and ethernet-over-CATV capability. These and other investments in infrastructure already allow the State to offer its students and teachers a substantial amount of two-way communications. For example:

- In Hawaii, 240 hours of distance learning programming is delivered each week: 72 percent is delivered live with interactive capability over the State's I-net.
- The University of Hawaii offers 40 to 50 courses each semester, including a number that fulfill associate's, bachelor's, and master's degree requirements. There are also courses that are part of emergency medical services training, courses that help preserve the islands' indigenous language, and workshops that prepare nontraditional students for higher education.
- The State Department of Education offers 65 hours of programming designed for students in elementary and secondary schools and for in-service teacher training. The State's standards are high: for example, the award-winning KidScience program has enabled students to speak with astronauts on the space shuttle and with scientists under the sea in Antarctica; and a series on a voyaging canoe, the *Hokule'a*, had its own Internet homepage and toll-free number so that schools could track the canoe as it sailed the Pacific.
- In early 1996, the Department of Education will launch its Electronic School, whose mission is to prepare Hawaii's students to succeed in the 21st century's global society. The first emphasis will be on the global Network News (a student-run Internet newspaper and news channel) and a student-run World Trade Center. The electronic approach will also allow students living in rural and remote areas to take the full range of course offerings provided throughout the State, or any student to take advantage of accelerated study.

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**"We have tried to create a community in Waialua Elementary like the real world . . . we call it our 'microcommunity.' In our system of government, we have a court and a legislative body called the House of Students. The School/Community-based Management Council (Hawaii's statewide school reforms council) allows the House of Students to pass bills which may even change the school's rules . . . . Maybe in the future . . . we could collaborate with other schools to create a United Nations of Students over the Internet dealing with world issues . . ."** ***Kelly Seleaka (5th grade student) and Ashley Barit (6th grade student)***

**"Connecting to any place, at anytime, with anyone is what we envision students doing . . . . Students need not just read about an event or place . . . they could literally travel, visit, and experience it . . . ."** ***Cindy Hagino, Waialua Elementary School resource teacher.***

## Arkansas ARKnet Brings Communities Together

ARKnet
Internet Access: http://www.uark.edu/state/ARKnet

What began in 1991 as an effort to link all higher education facilities in Arkansas to the Internet has mushroomed to include interoperable networks in the public school system, libraries, medical research facilities, State government, and cities and towns statewide. As of November 1995, all 4-year public and private colleges and universities, rural community colleges, and community centers in every part of the State had access to each other's information and education services and to the Internet.

The Arkansas approach is to help your neighbor. Every community project to join the Information Superhighway has, to date, been successful, and each success story becomes a model for the next. Communities send teams of technology planners to make site visits across the State looking for opportunities and solutions that may apply to their communities.

Mentoring among discipline specialists in higher education and public schoolteachers has flourished since ARKnet (the higher education and research network) met the Arkansas Public School Computer Network (APSCN), a private, nonprofit organization operating under the State Department of Education. ARKnet is operated by the University of Arkansas on behalf of more than 45 member institutions that support telecommunications and information infrastructure. In the APSCN network of the more than 1,500 school buildings targeted to be connected, more than 500 are currently online, supporting more than 2,000 teachers and administrators and more than 18,000 students.

Projects are now springing up all over the State to generate support for local infrastructure development. Funding streams combine community, State, and Federal sources. In the rural Lake Hamilton School District, for example, voters recently approved a $2 million capital outlay tax earmarked for technology development in the public schools. ARKnet and APSCN coordinate network design for sharing line costs in communities where these two networks coexist.

Among the uses of the combined networks are these:

- The Bernice Jones Center for Families has opened in Springdale, with a learning resource room that has Internet and videoconferencing capabilities and is open and free to the public. The Jones Foundation supports the project, which also links all Springdale public schools, the community center, ARKnet, and Internet, and provides every public school classroom with a computer for network access.
- Henderson State University established the Arkadelphia Community Network, a joint project with the university, TCA (a cable television service), and Digital Equipment Corp., which provides the broadband to ethernet technology required to make this network operational.

Other uses link members to the Arkansas Science Teachers Association, libraries throughout the State, and the University of Arkansas Government Relations Department homepage, which dispenses general information about the three branches of State government.

## SUMMARY

The collection of success stories presented here offers a rich mosaic of innovation depicting various ways communities are connecting to the Information Superhighway. Although each story is unique in its approach and context, the stories viewed as a whole offer some key insights.

First, there is no single or best starting point for connecting to the Information Superhighway. Getting started depends on the availability of "startup" funds, the knowledge and expertise of local leaders, and the readiness of community members. Encouraging communities to create their own approach, context, and framework is a powerful message in the stories.

Second, broad-based participation and collaboration are considered important strategies to build sustained commitment. Although many of the success stories point to the need for "champions" to lead the changes described, long-term success comes from the sustained participation of all stakeholders.

Third, technology is viewed as a facilitating force (not the driving force) for the substantive work of schools, libraries, and community centers. For example, many of the schools' success stories focused on the Information Superhighway and new forms of learning and innovative approaches to teaching.

Fourth, as communities move forward with connecting to the Information Superhighway they are grappling with difficult policy issues—acceptable fair use, privacy, security, and intellectual property rights.

# section2

## A LEADERSHIP GUIDE TO GETTING THERE

# part1
# Galvanizing the Stakeholders

Dedicated community-based leaders and change agents will be needed to kickstart communities and shape broader Information Superhighway applications at the local level. They are the best situated to identify, establish, and cultivate the key opportunities for building positive collaborations leading to successful projects within their own individual communities.

Locally based stakeholders—both on an individual and group level—can pool and leverage expertise, resources, and hard work to make lifelong learning and other community resources available to all through public access sites such as schools, libraries, and community centers.

Renewed focus on community awareness and equalized public access to Information Superhighway resources will improve the quality of life of all residents by:

- Empowering individuals;
- Increasing both individual and community creativity; and
- Reinvigorating community spirit by encouraging greater individual involvement in and responsibility for local affairs.

## THE STAKEHOLDER ROLE

Stakeholders are individuals, associations, or organizations with an interest in a particular issue. Because of their varied backgrounds, affiliations, and interests, they often hold different, and even divergent, perspectives on how to best manage the issue and even what the final objectives should be. However, despite dissimilar value systems and the potential for conflict, stakeholders can develop innovative, creative, and positive strategic alliances that often result in formal partnerships. Drawing from each other's strengths, such alliances and partnerships can pool and leverage collective knowledge, expertise, and resources—be they human, technical, or financial—to achieve mutually desired outcomes.

Positive, mutually beneficial alliances and partnerships are only possible when stakeholders commit to flexibility, negotiation, and compromise. To accomplish this, however, stakeholders must first agree on the desired outcomes and means to achieve them. Once desired outcomes have been identified, initiating stakeholders can identify, reach out to, and incorporate other locally based groups who have something to offer to the process—groups who can themselves become project stakeholders.

Collaboration requires open and frequent communications. Meetings should include policymaking and technical representatives who have decisionmaking authority. Partnerships can increase awareness on the range and depth of locally available expertise.

## Stakeholder Roles in KickStart

Despite the wide array of potential stakeholder groups who can richly inform and contribute to the goal of enabling ubiquitous societywide access to the Information Superhighway, achieving KickStart's goal involves primary stakeholders who can effectively operate at the grassroots level:

- **Educators.** Instructors from all educational levels, including K-12 schools, community colleges, 4-year colleges and universities, and institutions for vocational training and continuing education.
- **Librarians and other cultural heritage professionals.** Employees of libraries, museums, archives, historical societies, and the like.
- **Parents.** In collaboration with educators and with their own children.
- **Boards.** School, library, and community center boards that oversee the operation, budget, and management of these institutions.
- **Administrators.** School, library, and community center administrators who are responsible for daily operation and management of these institutions.
- **Private sector.** Individuals and organizations from the for-profit, not-for-profit, and nonprofit sector.
- **Government officials.** Elected officials and public servants at the State and local level; and the Federal Government as catalyst and grantor.
- **Foundations.** Institutions that provide financial grants for specific projects.
- **The Public.** Private citizens who volunteer their time and equipment for specific projects.
- **Other local community groups and users.** Individuals and organizations that represent labor, consumers, public safety, health, religious groups, special-needs and ethnically diverse populations, the elderly, user groups, and others.

To succeed, the KickStart Initiative must reach and spur each of these locally based stakeholder groups and individuals to act at the grassroots level to assist deployment of wide local public access to Information Superhighway technologies and, thereby, facilitate lifelong learning for every individual in their community.

Stakeholders in each community are central to providing vision and leadership for getting onto the Information Superhighway. Each primary KickStart stakeholder has a role to play to:

- Articulate and communicate a clear vision;
- Understand the potential the Information Superhighway offers for individual growth and the reinvention of communities;
- Understand its ability to improve the quality of education and democratic institutions;
- Learn lessons from existing successful projects; and

- Understand the limitations of technology, including costs and the other challenges associated with its use.

Below are descriptions of the roles that primary stakeholders can play.

## Boards

As planning components for community schools, libraries, and community centers, boards provide leadership vision by communicating the importance and relevance of connectivity to the broader community and encouraging others to share this vision. Members of school, library, and community center boards who have successfully implemented Information Superhighway projects recommend their counterparts in other communities undertake the following to reach their goals:

- Make connectivity a major institutional priority and reallocate resources—financial, technological, and staff—to achieve that priority;
- Hold joint meetings with other boards to address connectivity issues, and invite members of other community stakeholder groups to become involved;
- Create a working group that includes a facilitator, to coordinate connectivity logistics;
- Be willing to start small. Recognize that the technology is scalable. In the words of one stakeholder, "You don't need a Cadillac. You can start with a Chevy";
- Have your institution host network services and information resources of other community institutions and organizations and make them available to the public; and
- Look at capital investments in a new way, recognizing that technology infrastructure may require a lower initial investment, but that the investment will need to be renewed more frequently than other types of infrastructure investments. Explore how replacement budgeting will enable equipment and software upgrades over time and what ongoing training will be required and must be built into budgets.

## Administrators

Administrators involved in day-to-day management and operations of an institution provide the vision by communicating the importance and relevance of connectivity to the broader community and encouraging others to share that vision. Beyond that role, administrators must address some very specific requirements to achieve connectivity. Administrators who have achieved interconnectivity for their institutions report that the development and implementation process requires that they:

- Make connectivity a major institutional priority and rededicate existing resources—financial, technical, and staff—to connectivity projects;
- Develop strategic planning skills that incorporate the lifecycle of technology—both hardware and software—and training;

- Initiate cooperative efforts with others in the community to leverage resources;
- Establish a working group, including a facilitator, to coordinate connectivity logistics;
- Create a full-time project management oversight position;
- Identify and apply for the connectivity and development grants available from the public and private sector;
- Initiate electronic resources and technology training programs, recognizing that training programs must be ongoing, not a one-shot event—employees must be provided with adequate training resources and time so that they can use installed technologies effectively; and
- Provide "release time" so that employees can learn the technology and tie the rewards systems to connectivity goals.

### Government Officials

Government officials also have a role in providing leadership vision in communicating the importance and relevance of connectivity to the broader community and encouraging others to share in that vision. But they also have a much broader role. Government agencies should be active in this process:

- Encourage the development of electronic access to commonly consulted government and private sector information and resources;
- Work to establish a local point of presence so that community residents can access the Internet through a local telephone call;
- Provide startup seed money in the form of "connectivity grants";
- Establish partnerships with the private sector so that resources are pooled for joint projects;
- Initiate electronic resources and ongoing technology training programs, and provide employees with adequate training resources and time so that they can use the technologies effectively;
- Encourage employees to use their skills to help others in their community;
- Collect and disseminate best practices.

### Private Sector

Stakeholders in the private sector can, and should, provide financial, technological, and leadership support. Successful projects have often looked to the private sector stakeholders to:

- Provide startup seed money in the form of "connectivity grants";
- Encourage employees to volunteer their technological skills to the community, including providing assistance in planning for the use of information technologies;
- Donate quality, useful, used equipment to community organizations in need; and

- Provide assistance, if possible, with installation, software, and training; and work with community organizations to help determine what systems are needed and ensure that donated equipment is used effectively.

## Educators

Educators—especially principals and teachers—have perhaps the most important role of all stakeholders. Because they are often the most visible personae when students, parents, administrators, and members of the community are introduced to the Information Superhighway and make their assessment of its importance and power, these stakeholders are critical to the national connectivity goal. [redacted] of educators is, therefore, to:

- Speak to, educate, and lobby legislative bodies on the need for school connectivity;
- Harness information technologies to empower students to be lifelong learners and problemsolvers;
- Help all preschool and school-age children to learn to use the new technologies, especially children whose families cannot afford the technologies at home;
- Build partnerships with the private sector, libraries and other cultural institutions, government agencies, and the community to provide true lifelong learning;
- Develop access and acceptable use policies;
- Encourage and assist students to create content that can be shared over the networks;
- Enhance technology training in professional education programs;
- Prepare students to enter the emerging networked environment as seekers of employment and cultural enrichment; and
- Develop guidelines and educational programs that address the issues of intellectual property, privacy, and security.

## Librarians and Other Cultural Heritage Professionals

Many adults will enter the Information Superhighway for the first time using computers at public libraries and other facilities within their communities. Thus, as stakeholders librarians and other cultural heritage professionals have an important role in creating environments where Americans who have completed their formal education learn firsthand about technologies that they might fear, but that their children are beginning to take for granted. These stakeholders can further connectivity to the Information Superhighway if they:

- Work with community groups to create, host, and provide public access to electronic community information;
- Become a "local evangelizer" on the importance of connectivity;
- Use qualified volunteers for training;

- Develop the skills and training needed to employ technology to traditional tasks such as organizing, searching for, and retrieving information;
- Speak to, educate, and lobby legislative bodies on the need for library/ museum/archives connectivity;
- Develop access and acceptable use policies;
- Develop programs to prepare patrons with the information literacy skills they will need to effectively find and use information (navigation, quality filtering, etc.);
- Develop electronic resource subject area expertise to complement existing print subject area expertise;
- Build partnerships with the private sector, educational institutions, government agencies, and the community to provide true lifelong learning; and
- Develop guidelines and educational programs that address the issues of intellectual property, privacy, and security.

## *Parents*

Parents are critical members of the educational team, together with their children and with principals and teachers. Parents help when they:

- Support elected officials and school boards in developing and implementing policies supporting connectivity of schools;
- Encourage their children to learn about use of communications technology hardware and software in order to take advantage of learning and career opportunities;
- Join parent-teacher and other organizations that generate an environment of support for the Information Superhighway;
- Share technical expertise with teachers and staff;
- Help write strategic plans for technology; and
- Raise funds, especially with private partnerships.

"Parents who are professionals in the area of technology, like myself, who work with state-of-the-art technology day in and day out, are a valuable source of untapped information. USE US PLEASE!" —*Roger C. Wildersten, parent and director, Castro Valley Educational Foundation, Castro Valley, California*

## *Foundations*

Foundations have played critical roles in some of the most important medical, public policy, and technological developments in this century. Moreover, private, community, and corporate foundations and corporate giving programs are key funders for many innovative programs to improve education and educational opportunities throughout the country. As in so many areas, foundations have, and are continuing to have, sometimes critical roles in the implementation of the Information Superhighway. Foundations help when they:

- Act as convenors of community stakeholders to consider the KickStart Initiative;
- Provide startup seed money in the form of connectivity grants;

- Shift from a "bricks and mortar" orientation to committing resources to connectivity projects that have less tangible outputs;
- Insist that grant applications include a connectivity requirement, and give priority to good, cooperative projects;
- Fund projects that propose creative applications of new information technologies;
- Enter into collaborations with existing projects to determine where their resources can be appropriately deployed within the community; and
- Collaborate with other foundations and other private and public sector partners to pool and package resources for connectivity projects.

### *The Public*

Hundreds of thousands of Americans plug in to the Information Superhighway every day. They serve others in their community, while furthering the national goal of connectivity, when they:

- Volunteer technology and training skills to community connectivity projects;
- Become local evangelists;
- Work with schools, libraries, and community centers; and
- Influence local leaders.

### *Other Local Community Groups and Users*

Individuals and organizations that represent special interest, special needs, and other sectors of the population—such as the elderly—know best the kinds of information their audience needs and can benefit from. They help their constituents when they:

- Contribute funding, technology, and human resources to local connectivity projects; and
- Create and make institutional and organizational content available to community networks.

## STAKEHOLDER SYNERGY: LESSONS LEARNED

Part of the excitement surrounding the Information Superhighway stems from reports about highly successful cooperative ventures—local successes that were achieved because individual stakeholders chose to involve the whole community.

A commitment to cooperation, hard work, patience, and informed strategies is the best route for entering the networked Information Age—an era that is characterized by user-driven, interactive, and multimedia applications, and information resources that can be accessed remotely across a distributed environment.

An essential lesson from every success story is that an average citizen, with a dedication to making the Information Superhighway a reality in his or her community, can succeed. Visible results accrue in localities that are able to combine the talents and resources of local stakeholders creatively and realistically.

Among the most salient lessons learned from stakeholder ventures are:

- Don't wait for a "better" time—the time to act is now.
- Start small now. It is better than waiting for more resources. Great things can be accomplished with limited resources, and, to coin a phrase, success breeds success. Institute a pilot project rather than attempting to solve every contingency before starting.
- Embrace the notion of collaborative efforts with other community stakeholders. Don't feel that you have to go it alone.
- Pool and share resources and expertise to overcome knowledge and resource gaps.
- Educate other potential stakeholders in the community on the benefits they can reap.
- Develop a common vision with other stakeholders.
- Disseminate announcements calling for project volunteers—communitywide.
- Retain a "sense of adventure" about connectivity projects and tie in employee reward systems to desired outcomes.
- Create and provide in-house content to community projects.
- Recognize that frank and honest discussions and a willingness to compromise and listen to other stakeholders' points of view are essential.
- Recognize that because of the new networked environment, institutions and organizations will need to change if they are to remain relevant to the local community, and that part of that change will necessitate broad, intelligent use of information technology.
- Develop training programs, technical assistance capabilities, and maintenance programs. All are key components of a successful project.
- Institutionalize the mechanisms for sustaining projects independently.

# part 2
# Identifying Costs and Sources of Funding

"We search. We search for resources. We never give up, and we make things happen in spite of the challenges."—*Kathy Popp, technology coordinator, Chestnut Ridge School District, Fishertown, Pennsylvania*

The curriculum adviser rallied administrators, teachers, students, and parents to support reallocation of funds for connecting a Portsmouth, Rhode Island, public middle school to the Information Superhighway. Then the coalition obtained additional funds from local businesses, received free equipment from a high-technology firm, bought used equipment at salvage prices in a sale of U.S. Navy surplus materials, and completed connectivity.

In Fishertown, Pennsylvania (a small rural community), public school teachers used a GTE Pioneering Partner Award for free Internet access time to instruct their students.

The private Dalton School, New York City, with more than 250 computers and much more equipment, has received grants from foundations, business, and the Federal Government to expand curriculum and teaching methods using high technology. The school is sharing the results at no charge with public school systems around the country.

These examples bear on two basic questions that community leaders will ask: How much will connecting to the Information Superhighway cost and where will the money come from?

Funding sources must be identified for purchasing and installing equipment, training teachers and other instructors, and operating the network.

One of the more important findings of the Council is that the budgetary increases required to connect all schools, libraries, and community centers to the Information Superhighway are not as high as most people think and, in many instances, can be achieved with some careful reexamination of existing budgetary paradigms. This is not to suggest that the cost will be insignificant or that such an ambitious goal will be easy to achieve. Rather, what it says is that the goal is attainable, and is a reality already in a number of communities throughout the United States. Besides, the costs should be viewed as a community investment that will bring many short- and long-term benefits to everyone.

In a study conducted for the Council, McKinsey & Company* found that connecting every K-12 school computer laboratory to the Superhighway by the year 2000 would require between 1 and 2 percent of the projected K-12 education budget. Connecting every classroom by the year 2005 (with a ratio of five

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*The models and cost estimates presented here for K-12 schools are derived from the study McKinsey & Company, Inc., conducted for the Council. Please refer to their publication, *Connecting K-12 Schools to the Information Superhighway*, 1995, for a more detailed discussion of this information.

students per computer) would require between 4 and 5 percent of the total K-12 education budget. By comparison, about 1.3 percent of public K-12 spending is now devoted to technology.

In every community, the costs for infrastructure development—whether for schools, libraries, government offices, health care, museums, community centers, or the like—will vary depending on the technology selected and benefits desired. The number of possible approaches to infrastructure deployment is infinite. For instance, deploying technology in every classroom in a school district would likely provide strong educational benefits but would be far more costly than deployment at the computer lab level, which would be easier to fund but perhaps less beneficial for students.

## SCHOOLS

With assistance from McKinsey & Company, Inc., and based on information provided by numerous educational institutions and bodies, government officials, and private industry participants, the *key insights* about deployment costs for K-12 schools are as follows:

- **Costs for Hardware.** The purchase and installation of hardware constitutes the largest upfront cost. Approximately 55 percent of this cost is for computer hardware and software; and 25 percent is for printers, scanners, security, and furniture stations.

  Twenty percent of the costs for hardware are for retrofitting—electrical and heating, venting, and air conditioning (HVAC) upgrades. This cost could be much lower or higher as a percentage of the total for an individual school, depending on its current infrastructure and the age and condition of its facility. Alternative technologies (wireless local area network, for example) should also be considered, especially in cases where retrofitting costs are prohibitive because of the state of the facilities.
- **Costs for Teacher Training.** Teacher training and support constitute the largest ongoing cost during the 5- to 10-year period of deployment. This training would include formal programs, on-the-job support from curriculum specialists, and use of the technology on the teacher's own time (although this latter category is not included in the total). The overall cost should decline over time as teachers enter the system with higher levels of skill and as existing teachers gain more experience with the technology. For the near term, however, it is essential that resources be devoted to this category.
- **Costs for Connection.** The cost of connection per se is a relatively small portion of overall expenditures. Connecting to a school that is installing a computer laboratory is only 8 percent for initial deployment and 15 percent for ongoing costs; connecting within the framework of deployment throughout classrooms is only 4 percent for initial deployment and 7 percent for ongoing costs. Over time, however, increased levels of usage could drive up the relative cost of connection. Depending on the amount of upfront costs, the usage charges thereafter, and the potential

need to upgrade for higher capacity at a later date, schools should consider installing connections that have greater capacity (for supporting multiple users and carrying large amounts of data) than they need today or even project they will need in a few years.

A complete analysis of the costs of the Information Superhighway must take into account ongoing maintenance and support costs as well as initial purchase and installation costs; the costs of the human elements of infrastructure deployment, especially teacher training; the value of the existing technology infrastructure (e.g., the number, status, and distribution of computers already in the public schools); and the hardware necessary to make the networks fully functional (such as file servers or printers). The costs should also include the costs for hardware and software that may be required to adapt to the needs of users with disabilities. Incorporating those needs into the planning stage is typically less expensive than retrofitting. In addition, the analysis should amortize hardware costs over time and include factors in future cost curves that affect technology installation and upgrades.

The costing models presented here are a starting point. These models focus on an array of computer networking technologies found in an ever-increasing spectrum of information and communication technologies. Although these models are useful for understanding costs of selected computer-based infrastructures, they represent only a few of the many options available to schools, libraries, and community centers. For example, these models may offer direction for addressing broader information infrastructure goals requiring greater flexibility and interactivity through integrated video, voice and data applications, and integrated platforms—computer multimedia networks, wide-bandwidth connections (digital wire or fiber), television, VCR recorder/player, wireless transmitter/receiver, digital satellite transceiver, etc.

Individual schools and districts might choose alternative options and make other tradeoffs between costs and potential benefits. For example, purchasing lower cost computers could have a substantial impact on initial deployment costs, but computer capabilities will dictate the range of applications students and teachers can use. Reductions in teacher training could substantially reduce the largest source of ongoing costs during the deployment timeframe, and yet teacher training is one of the most essential elements to ensuring effective implementation. Finally, tradeoffs can be made with respect to exploiting current technology versus experimenting with or waiting for more advanced technology.

The models for technology deployment were selected based primarily on fundamental economic breakpoints between different options—costs rise significantly at certain decision points, such as deciding between connecting at the lab level versus the classroom level.

The major cost drivers and the economic breakpoints between different deployment options depend on the levels of infrastructure, timing, and cost. The models take currently existing infrastructure into account. Although the Council knows that deployment will take place at varying speeds in different schools and districts, it has made the simplifying assumption here that each model is implemented evenly over either a 5- or 10-year period (i.e., by 2000 or 2005). In each case, costs are evaluated in detail across six infrastructure elements:

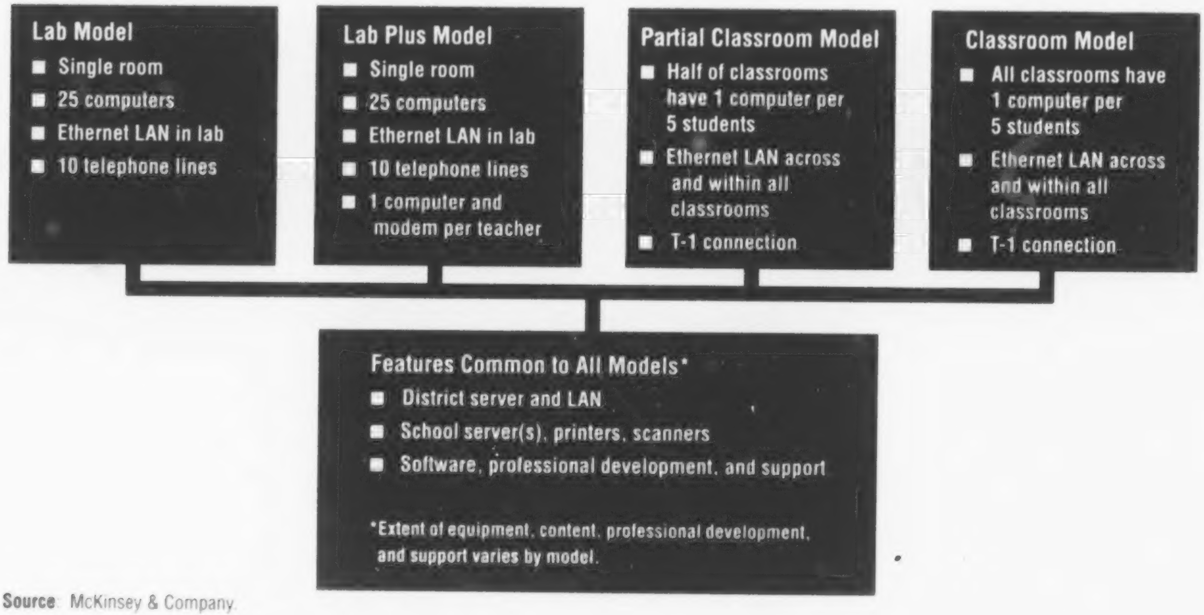
1. The external connection—the wide area networks that will connect schools to each other and to the Information Superhighway;
2. The internal connection—local area networks that link computers within the given school;
3. The computer, video, and related hardware (including the file servers, printers, scanners, and other equipment needed for full functioning of the technology);
4. Software and online service subscription charges;
5. Teacher training; and
6. Ongoing operational support.

Although it is difficult to assess the actual distribution of costs around the average, the major sources of variation have been identified. Assumptions have also been made concerning required technology upgrades and cost reductions over time. Finally, both the onetime purchase and installation costs as well as the ongoing operations and maintenance costs have been quantified.

Given this approach, the models are defined as follows:

- **Lab Model.** The basic "Lab" model envisions connectivity at the lab (or multimedia room) level for each school. It includes 25 networked computers with 10 analog telephone lines per school (although 5 ISDN lines can easily substitute, and double the performance capability at little extra cost, depending on the tariff structures of the particular State). This option gives scheduled access only to teachers and students—for example, a given class of students might be able to use the lab for an hour a day. This intermittent usage requires a higher level of commitment by all involved parties to ensure an effective level of integration into the curriculum. This type of setup may be most appropriate for schools that are just beginning to experiment with technology and connectivity or where building basic computer and networking skills is the main focus.
- **Lab Plus Model.** In addition to all the technology assumed by the basic "Lab" model, the intermediate "Lab Plus" model adds one networked computer for each teacher (i.e., a LAN connects all classrooms). The rationale is to give teachers adequate exposure and access to the technology to expedite teacher skill building, providing them with the opportunity to master and adapt the technology to their specific teaching needs. Ideally, this model might also facilitate migration from access in the lab to access in the classrooms over time.
- **Partial Classroom Model.** The "Partial Classroom" model assumes that only half of each school's classrooms are connected with networked computers. The ratio is the same as with the "Classroom" model—five students per computer with a T-1 (1.5 Mbps) connection (or a substitute if T-1 is not available). The model is designed to illustrate a less costly

**Figure 1. Features of Models for a Computer-based Infrastructure**


Lab Model
Single room
25 computers
Ethernet LAN in lab
10 telephone lines
Lab Plus Model
Single room
25 computers
Ethernet LAN in lab
10 telephone lines
1 computer and modem per teacher
Partial Classroom Model
Half of classrooms have 1 computer per 5 students
Ethernet LAN across and within all classrooms
T-1 connection
Classroom Model
All classrooms have 1 computer per 5 students
Ethernet LAN across and within all classrooms
T-1 connection
Features Common to All Models*
District server and LAN
School server(s), printers, scanners
Software, professional development, and support
*Extent of equipment, content, professional development, and support varies by model.

**Source**: McKinsey & Company

variant—and possible step on the path—to the classroom model. It also presupposes that some classes or teachers are more logical starting points for deployment than others. For example, a school may choose to begin deployment in specific-subject classrooms or with teachers who appear particularly open to experimentation and change.

- **Classroom Model.** The "Classroom" model connects every classroom of every public K-12 school to the Information Superhighway. Classrooms are connected with networked computers at a ratio of five students per computer with a T-1 long-distance, point-to-point communications channel that transmits data, video, and voice at 1.5 Mbps (or a substitute if T-1 is not available). In this setup, students can work in groups of three to five around a computer and have convenient and relatively quick access to a broad range of potential courseware, online services, and video-based materials. By placing the computers directly in the classroom, the technology can be more closely integrated with the curriculum. Teachers will be able to incorporate computers and connectivity in teaching the full range of subjects throughout the course of the classroom day, and students will have regular, almost constant access to the technology.

Features of these models are summarized in Figure 1.

All models include the local area networks, file servers, printers, and other equipment necessary for full functioning of the technology, as well as needed upgrades over time. The models also include appropriate levels of courseware, teacher training, and technical support.

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Although a "Desktop" model, which puts a networked computer on every student's desk, was also considered, this model involved substantially greater expenditures. It entailed more than 2-1/2 times the cost of the "Classroom" model in the final year of deployment even when deployed over a longer timeframe, and more than 3-1/2 times the cost of the classroom model for initial installation costs. For this reason, the desktop model is not examined in depth, although that model might be desirable from an educational standpoint for certain schools or at some future date.

Costs for dedicated video (i.e., video screen and camera) and dedicated voice (i.e., telephones and voicemail) were calculated separately. Although the technologies may converge in the future, these computer, video, and voice platforms are discussed as separate technologies here. Many computers are currently capable of full-motion video and should be able to handle voice transmission before long.

### Summary of Costs for Each Model

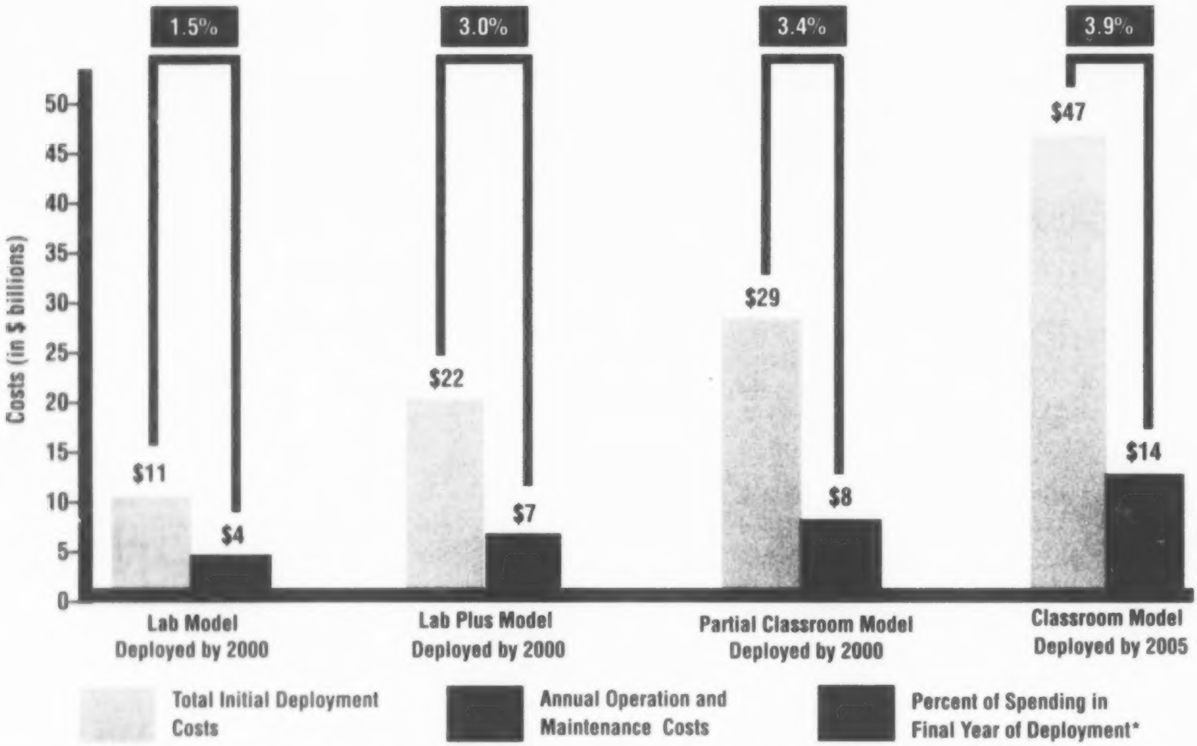
To implement the "Classroom" model across the Nation by the year 2005, onetime purchase and installation expenditures would total approximately $47 billion or $965 per student, while ongoing operations and maintenance expenditures would be about $14 billion per year over the 10-year deployment period or $275 per student. In the "Partial Classroom" model, onetime purchase and installation expenditures total approximately $29 billion over the course of a 5-year deployment or $610 per student. Ongoing operations and maintenance expenditures would be about $8 billion per year or $155 per student. In the "Lab Plus" model, onetime purchase and installation expenditures total approximately $22 billion over the course of a 5-year deployment or $460 per student. Ongoing operations and maintenance expenditures would be about $7 billion per year or $150 per student. In the "Lab" model, onetime purchase and installation expenditures total approximately $11 billion over the course of a 5-year deployment or $225 per student. Ongoing operations and maintenance expenditures would be about $4 billion per year or $80 per student.

Again, as a reference point, current expenditures on equivalent technology are running at about 1.3 percent of the education budget. Figures 2 and 3 break down deployment costs by model and component costs.

## PUBLIC LIBRARIES

As with schools, public libraries have a range of options for deploying infrastructure. Libraries have fundamental choices to make both about the level of functionality (what services to provide) and the choice of technology (how to provide services most efficiently). In addition, as with schools, libraries need to plan for the soft infrastructure (training, content—including subscriptions and site licenses to access content—and system operation/support) just as much as the hard infrastructure (external connection, a LAN, computers, and related equipment).

Figure 2. Estimated Cost of Deploying and Operating Infrastructure in Public K-12 Schools with the Four Models



*Reflects the Department of Education's forecast of an average increase in the education budget of 5.6 percent per year (including inflation) through the year 2005.

Source: McKinsey & Company.

Figure 3. Cost Components for Deploying, Operating, and Maintaining Classroom and Lab Models in Public K-12 Schools

| | Initial Deployment Costs | | Annual Operation and Maintenance Costs | |
|---|---|---|---|---|
| | **Classroom Model** | **Lab Model** | **Classroom Model** | **Lab Model** |
| Hardware | 51% | 34% | 14% | 17% |
| Professional Development | 14 | 19 | 41 | 31 |
| Content | 14 | 20 | 21 | 26 |
| Connection within School | 13 | 12 | 4 | 5 |
| Connection to School | 4 | 7 | 7 | 15 |
| Systems Operation | 4 | 8 | 13 | 6 |
| | 100% | 100% | 100% | 100% |
| Total Cost (in $ billions) | $47 | $11 | $14 | $4 |

**Source:** McKinsey & Company.

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**Figure 4. Cost Components for Deploying, Operating, and Maintaining Online Services in Libraries**

| | Initial Deployment Costs | Ongoing Costs |
|---|---|---|
| Application Hardware | 24% | 12% |
| Application Software | 8 | 3 |
| Training and Support | 27 | 32 |
| Content/Resource Development | — | 23 |
| Connection within Library | 17 | 3 |
| Connection to Library | 4 | 9 |
| System Integration and Support | 20 | 18 |
| | 100% | 100% |
| Total Cost (in $ billions) | $1.6 | $1.3 |

**Source**: NIIAC Analysis, Department of Commerce.

Public libraries should be connected to the Information Superhighway by the year 2000. The Council estimates that the initial deployment costs to connect public libraries to the Information Superhighway should be about $1.6 billion, and that ongoing costs will be more than $1.3 billion per year.

The cost model, as shown in Figure 4, is intended to serve only as a starting point for determining the cost of connecting all public libraries in the United States to the Information Superhighway. Existing raw data for determining levels of technology in public libraries is nowhere near as robust as the data available for public schools. Additional research is required for a more accurate estimation of costs.

The Council realizes that public libraries face access and service provision problems that differ from those faced by schools. Bandwidth capacity and other connectivity issues can result in substantial differences in the costs of connecting urban and rural libraries to the Information Superhighway.

Another factor to consider is that public libraries have already made some progress toward providing Internet and other Information Superhighway-related services to the public. *The New York Times*, citing library sources estimated that 9 percent of America's libraries offer Internet access. A much higher proportion offered other electronic services, such as CD-ROMs, online public access catalogs, commercial databases, and electronic texts. Public libraries in several rural regions throughout the United States do have sophisticated broadband networks available to them. Iowa, Nebraska, North Carolina, and other "rural" States have deployed high-capacity, broadband networks that can supply rural subscribers with access to a wide variety of broadband services. Therefore, the overall costs presented in the model may be overestimated, because, to a certain extent, the infrastructure needed to connect public libraries to the Information Superhighway is already being deployed, and to a greater extent than it has been among public schools.

Furthermore, using the lab model to determine costs may be overkill— some public libraries may not need that capacity to satisfy patron demand. A simpler model, say 10 computers with 4 simultaneous users, for example, may be more applicable in determining costs for public libraries where the service area is relatively small. Applying such a model would reduce the overall cost presented in the cost model.

As with schools, the connection charges faced by libraries will differ significantly. The Council's model has attempted to compensate for this difference by dividing public libraries into two segments: libraries with a service-area population of 25,000 or more; and libraries with a service-area population of less than 25,000. Libraries serving a population of more than 25,000 are assumed to have access to T-1 lines (1.5 Mbps), while 60 percent of libraries serving a population of less than 25,000 are assumed to have access to ISDN lines (56 to 128 Kbps) and 40 percent are assumed to have plain old telephone service (POTS—14.4 to 34 Kbps). The model does not take into consideration the bandwidth capabilities of States such as Iowa, Nebraska, or North Carolina, for example, which may be considered rural but have very sophisticated broadband networks in place throughout the State.

Additionally, although software applications for public schools can be relatively uniform across the Nation, the same cannot be said for public libraries. Because customer demand for certain applications varies from library to library, a uniform average for the ongoing costs of software applications could not be developed for this model. The Council used an average ongoing cost of $2,000 per library for the purpose of the cost model, however, the ongoing costs of software applications for public libraries will vary significantly from region to region, depending on what applications patrons demand from their local public libraries.

In addition to information taken from the McKinsey lab model, the Council also employed information from a report issued by the U.S. National Commission on Libraries and Information Science (NCLIS) on the costs of providing Internet access in public libraries to develop its projections of library costs. Although the NCLIS work addressed the costs of Internet provision only, it illustrated the order-of-magnitude costs libraries might expect to incur in providing Information Superhighway access. The study also provided examples of cost considerations public libraries must take into account as they connect to the Information Superhighway.

## Categories of Costs for Connecting Libraries

**Initial Deployment Costs**. The onetime cost for supplying a given number of public libraries with the necessary hardware and software to operate and maintain a lab model (i.e., 25 networked computers with 10 simultaneous users).

**Ongoing Operation/Maintenance.** The annual costs necessary to maintain a lab model for a given number of public libraries. These costs are primarily for service charges, user and maintenance fees, etc., which must be paid to maintain the network.

**Connect to Library**. The cost of connecting the public library to the existing communications infrastructure via POTS, ISDN, or T-1 lines. The figure includes the cost of necessary customer premises equipment (CPE) and usage fees (where applicable).

**Connect within Library.** The cost of networking the computers within a particular public library. The figure includes installation, purchase, retrofitting, and replacement costs for the LAN.

**Application Hardware.** The cost of computer equipment, including terminals, printers, and scanners.

**Application Software.** The cost of necessary software needed to gain access to the Internet and other electronic services (e.g., online public access (OPAC) Gateway, commercial Internet navigation software). Average ongoing cost of $2,000 per library assumed.

**Content/Resource Development.** The cost of software and online services necessary for a public library to be both a consumer and producer of information over the Information Superhighway. In this case, the cost model includes the cost of two services: *Bowker's Books in Print* and *Carl UnCover*. The *Carl UnCover* estimate includes $5,000 for standard access via the Internet and 500 articles downloaded at a cost of $6.50 each. There may be additional software and service required by individual public libraries, each adding an additional cost to this category.

**Training and Support.** The costs of staff training, public training, and Internet training positions and document development necessary for a public library to support active connection to the Information Superhighway.

**System Integration and Support.** Consulting costs and the cost of keeping one-half to one trained professional on staff to maintain support of the lab model.

## COMMUNITY CENTERS

Community centers represent an excellent supplement to schools and public libraries in terms of meeting the lifelong learning needs of a community and providing public access to the Information Superhighway. Connecting community centers to the Superhighway may also serve to fill in the gaps left by schools and public libraries. Connecting community centers can fulfill the access needs of the nonschool population of a community; can extend the hours that access to the Information Superhighway is available to the community; can bring the community closer together; and can create a point of access for special interest groups within a community—e.g., senior citizens, veterans, Native Americans, etc.—who might not otherwise access the Superhighway.

The Council has defined a community center as a physical location where community members go to meet others, learn, play, or access information resources. This definition encompasses a broad range of locations, such as: centers for "at-risk" populations—e.g., public housing projects or Boys/Girls clubs; cultural or religious centers—e.g., churches or ethnic centers; public institutions—e.g., municipal recreation departments or post offices; and government offices—e.g., city or town halls. Even privately owned shopping malls, banks, museums, and grocery stores can be regarded as centers where communities meet and, in fact, have been targeted as test sites for several community networking efforts. In addition, electronic community centers have been established in the form of online community bulletin boards, chatlines for selected communities-of-interest—e.g., LatinoNet, SeniorNet, Alzheimer's Disease Network, and World Wide Web pages. In the broadest sense, a community could seek to be "wired" by connecting a range of physical community centers as well as creating electronic communities that connect individuals or groups to each other and to community resources.

Given the diversity of locations for community centers, the Council has used "surrogates" to estimate the number of community center locations across the Nation. As a short-term goal, each of the 11,097 "places" (communities with a population of 2,500 or more as defined by the U.S. Bureau of the Census) throughout the United States should have at least one connected "community center" by the year 2000. As a long-term goal, the Council has expanded the number of community centers connected to the Information Superhighway to about 40,000 locations throughout the United States by the year 2005 (the number 40,000 was chosen because it approximates the number of neighborhoods represented by the current number of 39,372 post offices throughout the Nation). The number of Census-designated places and post offices cited above is used as a scale of magnitude. The Council recognizes the need for more than one community center access point in larger population areas for the community to be effectively connected to the Information Superhighway.

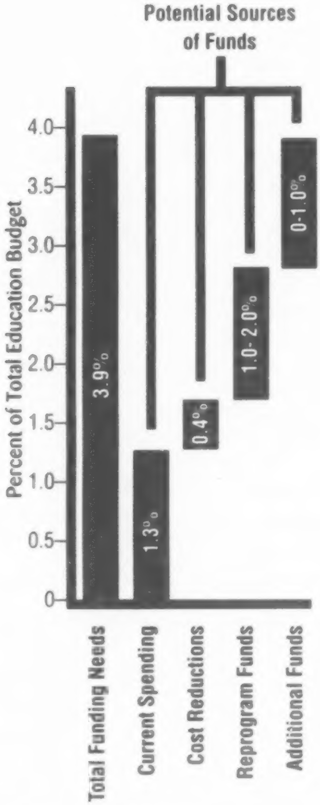
Defining the role the community center should play helps define and limit the number of appropriate locations. If the goal is to provide convenient, affordable access to the Information Superhighway for the general populace of a particular community, centers to consider include: libraries where people currently access printed resources; city or town halls that serve as gathering spots or data repositories; post offices, which have historically handled correspondence; and even shopping malls that teenagers frequent. Other roles could include: providing targeted, programmed learning and access to the Superhighway for at-risk groups—e.g., high school dropouts, the homeless, underprivileged children, and ex-offenders; serving as a substitute for K-12 school or public library access for selected communities—e.g., certain Native American communities; making community resources available in electronic form; and providing afterhours access to the Information Superhighway for K-12 students.

If the role for a community center (or for a community network) is to provide basic public access to the Information Superhighway, the applications might be limited to e-mail, access to selected online databases or community bulletin boards, and emergency services. As the role extends into providing programmed learning modules for students and adults, the possible application set becomes enormous. In Native American communities, for example, tribal centers that end up supplementing schools will need to provide a suite of applications similar to that needed for deploying technology in public K-12 schools. Another possible role is that of the "electronic community," in which community members create some of the content transmitted over the local electronic network rather than simply providing access to preexisting information and services. In such electronic communities, community bulletin boards could include public and private industry job listings, city permit applications, vehicle registration information, resources for starting up and growing small businesses, mechanisms for conducting transactions online, and announcements for emergency procedures.

## SOURCES OF FUNDING

Although the costs associated with implementing the Information Superhighway within schools, libraries, and community centers appear to be within reach, they present a significant cash outlay to local communities, many of which are already operating under tight budgets. The Council has identified a number of funding options that community leaders might want to explore as they search for funds to connect facilities to the Information Superhighway. Figure 5 illustrates options for sources of funding. These options fall into three categories: alternative funding mechanisms, reprogramming of existing sources of funding, and cost-saving measures.

**Figure 5. Potential Sources of Funds for Connecting Classrooms**



Source: McKinsey & Company.

The array of possible funding alternatives to equip schools, libraries, and community centers with the necessary technology is vast. The majority of the funding alternatives listed in Figures 6 through 8 are real alternatives that have been used effectively in funding K-12 school initiatives throughout the United States.

Some States have also begun developing competitively neutral universal service programs that improve the opportunities for schools, libraries, and community centers, as well as individuals, to participate in the Information Superhighway. For example, the Wisconsin Public Utilities Commission recently proposed a revision to its universal service rules that would establish a fixed budget to allow for rate discounts for the first 3 years to institutions, including schools and libraries, that obtain new advanced services or Internet access from their telecommunications providers.

### Cost-Saving Measures

In addition to generating funds to connect communities to the Information Superhighway, State and local governments can realize savings from the existing technology infrastructure costs and apply the cost savings toward accelerating the deployment of the local technology infrastructure. Figures 7 and 8 give good examples of potential cost-saving measures.

For example, State and local agencies could aggregate demand (school district as a whole, school district plus city, hospitals and libraries, education departments, and other government agencies) to obtain volume discounts and bulk contracts for hardware and software. For example, Cooperative Library Agency for Systems and Services (CLASS) offers discounts to libraries on many Superhigh-

## Figure 6. Potential Sources of Additional Funding

| Source of Funds | Mechanism | Examples |
|---|---|---|
| Federal Government | ■ Regulation<br>■ Categorical Funds/Grants | ■ FCC or Federal legislation<br>■ Special Federal funds allocated to education, e.g., DOE Technology Learning Challenge grants ($9.5 million in FY 95); Library Services and Technology Act; Department of Commerce/NTIA's TIIAP funding ($24.4 million in matching funds in FY 94, of which the largest percentage of requests were for education and community information networks) |
| State | ■ Direct | ■ Allocation of funds by legislature, e.g., Florida—$128 million in 1995; Ohio—$9.5 million; Utah—$5 million |
| | ■ Bond issuance | ■ Bonds issued for technology infrastructure, e.g., New York—$700 million for 5-year technology program; Iowa—$18 million to expand the number of schools connected to ICN in 1995 |
| | ■ Regulation | ■ PUC-approved programs for reduced rates and/or free service, e.g., California, Indiana, Georgia |
| | ■ Lottery | ■ Nebraska lottery sets aside a portion of proceeds for its Education Innovation Fund and for use in technology projects |
| District/County | ■ Tax increase | ■ County in Louisiana added 0.5% to its sales tax for a period of 3 years and then 1% for 10 years to pay for education |
| | ■ Entrepreneurial ventures | ■ Selling educational software—Port Hueneme, CA; charging for access to file servers or computer systems—Charleston, GA, and Mendocino Unified School District, CA |
| | ■ Bond issuance | ■ Bethel School District, Oregon—$16.4 million education bond issue with $3 million for technology |
| Private Sector | ■ Donations | ■ Donation programs of money, equipment, time, and other resources, e.g., Apple/Classrooms of Tomorrow; PacBell/CalREN—$25 million program to stimulate development of applications for high-speed data communications services; Bell Atlantic—Union City Schools, NJ.<br>■ Numerous college and university contributions of software, training, etc. |
| All levels | ■ Grants | ■ Available from Federal and State agencies as well as foundations and private industry. |

***Source:** McKinsey & Company, Inc; information from NIIAC members and staff.

way-related items, including hardware, software, Internet services, and furniture. CLASS is a self-supporting public agency and a buying consortium for its cooperative members. Another example is the Educational and Institutional Cooperative Service, Inc., which is a not-for-profit buying cooperative open to tax-exempt colleges, universities, private schools, hospitals, medical research institutions, and hospital purchasing organizations.

If Federal or State legislation allows for educational discounts or community access set-asides, State and local governments can take advantage of such measures in budgeting for services. For example, Louisiana requires that schools be charged residential rather than business rates; in Texas, telecommunications

**Figure 7. Current Proposals/Actions to Reduce Infrastructure Costs**

| Element | Method | Examples |
|---|---|---|
| Hardware | ■ Purchasing cooperatives at county/State or regional levels can significantly reduce the biggest cost element.<br>■ Used computers donated from businesses. | Nation Christin Foundation<br>Detweiler Foundation |
| Software | ■ Negotiate discounts in purchase price and alternative licensing agreements.<br>■ Develop cooperative ventures with courseware developers and/or in-house curriculum developers. | Microsoft, Apple, PacBell (California)<br>NSF CoVis project (Learning through Collaborative Visualization) with Northwestern University, NASA |
| Professional development | ■ Extensive peer training and support could produce significant cost savings because training/development represent 30-40% of ongoing costs.<br>■ Develop private sector training/support partnerships. | Virtual School Network, Tennessee<br>AT&T Foundation/Nat'l Council for Accred. of Teacher Education (NCATE), US West/Teacher Network |
| Systems operation | Make use of:<br>■ Wide availability of best practices and "how-to" materials and resources.<br>■ Onetime repair contracts.<br>■ Vendor-provided integration/operation. | See NTIA listing of online sources |

**Source:** McKinsey & Company, Inc.; information from NIIAC members and staff.

services related to distance learning must be provided at rates 35 percent below normal charges; and most of Hawaii's K-12 public schools are connected via an Institutional Network (I-NET) based on SONET, ethernet-over-CATV, and other fiber technology, and funded through cable franchise fee agreements.

Use of older equipment, or least-cost technology where feasible, is another means of reducing costs in deploying hardware throughout K-12 public schools. New York's "BET Initiative" (Business for Equity in Telecomputing), and California's Computer Recycling Center are examples of organizations that recycle used equipment from businesses and individuals. Gifts in Kind America connects companies willing to donate computers to needy school districts and nonprofit organizations. In 1994, Gifts in Kind America reported $118 million in donations—total donations from this organization had reached $100 million by the end of the first 6 months of 1995.

Considerable savings can also be generated through collaborative educational courseware development and teacher training projects such as CoVis (Learning through Collaborative Visualization), a cooperative venture funded by a National Science Foundation $3.5 million grant that partners Northwestern University, the University of Illinois, the Exploratorium in San Francisco, and Bellcore with networks of more than 7,000 students and teachers throughout the United States. CoVis approaches to teaching science employ a broad range of communications

**Figure 8. Current Proposals/Actions to Reduce Connection Costs**

| Method | Publicly Considered Proposals or Actions Taken | Examples |
|---|---|---|
| Special rates/ Subsidies to schools | ■ Charging schools residential or other discounted rates can save more than 50% of connection charges for the lab or classroom models. | ■ Louisiana (PUC/1994)<br>■ Texas (Act 231, 1995) |
| | ■ Providing free connection to the network by telephone and cable companies during broadband deployment would save installation costs. | ■ California (PUC/1994)<br>■ Hawaii (CATV franchise agreements/1988) |
| | ■ Lease/purchase plans that reduce financing costs can be obtained. | ■ Carrollton, Georgia |
| | ■ Free upgrade of present cable connections to two-way would save 74% on installation costs. | ■ Alabama |
| Direct negotiation with provider | ■ Individual negotiations or pricing of lower specification connection can lead to savings of 90% on ongoing connection costs. | ■ Pittsburgh School District |
| | ■ Negotiating purchase discounts for high-volume and educational use with CPE manufacturers would save money. | ■ Pittsburgh School District |
| Volume purchasing by States | ■ Aggregated demand could generate up to 60% in savings for connections to schools. | ■ Public Technology, Inc. |
| Extend connection to other government agencies | ■ Cost savings would be achieved in telephone bills, administrative costs, personnel costs, etc., by spreading the cost of the network among a number of government agencies. | ■ North Carolina |
| Donations/partnerships with communications carriers and others | ■ Pilot projects that involve telecommunications carriers and other information technology businesses would save money. | ■ Mendocino Unified School District, CA (Autodesk, NASA, PacBell, MCI, Apple) |
| Connections within schools | ■ Using volunteers/technical support to pull cable can save 10% or more of internal wiring costs.<br>■ Using volume discounts can save money. | ■ California (NetDay '96) |

**Source**: McKinsey & Company Inc.; information from NIIAC members and staff.

technologies such as desktop videoconferencing, shared software for real-time collaboration, a multimedia scientists' "notebook," and scientific visualization software that place students in a realistic scientific environment.

Impressive savings in costs for teacher training have been achieved through projects such as Tennessee's Virtual School network. More than 11,000 of this State's teachers have been fully trained to use computer networks as the result of funding and staff contributions from Oak Ridge National Laboratories, Vanderbilt University, the University of Memphis, Pellissippi State Technical College, the Tennessee Chamber of Commerce and State of Tennessee, the Eisenhower Foundation, the Appalachian Regional Education Lab, and BellSouth Corporation.

Sometimes the costs associated with ensuring access to computers and network-based services for users with disabilities can be higher than the cost of the basic individual terminal or workstation—some types of adaptive technology can be expensive and difficult to find. These costs can be eliminated, in some instances, by ensuring that the off-the-shelf equipment purchased is as usable for persons with disabilities as possible, with built-in features such as text or screen enlargers, keyboard alternatives to the mouse, single-keystroke command features, onscreen substitutes for auditory cues, screen readers, and other features that allow the user to customize the interface.

## Reprogram Existing Funds

A second set of actions focuses on shifting existing educational funds to new uses. Textbooks account for about 50 percent of schools' expenditures on instructional materials, supplies, and services, or about 2 percent of total school spending. Some of these funds could instead be used for multimedia courseware and online instructional materials, supplementing (or replacing) traditional textbook purchases. Another 8 percent of school spending is currently devoted to "instructional support," such as instructional supervisors—e.g., the head of the math department. Some of these resources could be redeployed to address teacher training and support needs. For example, instructional supervisors could focus on helping teachers integrate technology-based tools into the curriculum.

Reprogramming funds within these natural categories could contribute 1 to 2 percent to the technology budget. In addition to the 1 to 2 percent from natural candidates, some general funding categories can also be reprogrammed. In Carrollton, Georgia, for instance, the district cut administrative staff by 20 to 30 percent, releasing funds for technology and connection within their schools, and some schools, such as those in the Hueneme District, California, have chosen to fund technology rather than teachers' aides.

Funds for technology can come from reallocating money in existing budgets in addition to increasing these budgets. Reallocation of increasing amounts of local school district budgets, of grant funds awarded for lower-priority programs, of the existing State education budget or existing State funds becomes more likely when the benefit from deployment can be measured in the form of higher skill levels, greater productivity and communications, and so on.

## Alternative Funding Mechanisms

The third, and perhaps most difficult, funding option is to seek additional funds. Currently, State and local government funds cover 84 percent of the Nation's public K-12 education budget, but directly account for only 60 percent of technology spending. Some State and local governments have issued special educational bonds, increased taxes, and/or allocated lottery funds to cover investments in education technology. A range of other funding sources are currently providing support for technology, including Federal Chapter 1 and Chapter 2 funds. Local leaders need to be aware of the range of possibilities for funding and determine which alternatives are appropriate, based on the unique needs of their community institutions.

States can appropriate new general funds to increase their education technology through a number of means. Recently, increased levels of funding for school technology were passed in Florida (from $36 million in 1993 to $135 million in 1994), Kentucky ($63 million), Texas ($99 million), and Tennessee ($78 million), for example. As an alternative, other States are increasing State and local income taxes, general sales taxes, or adding a special sales tax—a county in Louisiana, for instance, recently increased sales taxes by 0.5 percent for 3 years and 1 percent for subsequent years for this purpose.

Some States and local governments such as New York, Iowa, Delaware, and School District 4J in Eugene, Oregon, are also issuing general obligation bonds or revenue bonds for educational technology and infrastructure. Others are providing tax credits or incentives to individuals or private companies that donate technology or assist their communities to connect to the Information Superhighway. And still others, such as Nebraska and Georgia, have used State lotteries for these purposes. Figure 6 provides examples of these sources of funding.

Schools, libraries, and communities also have leveraged Federal funding programs such as the Department of Education's Technology Learning Challenge grants and the Department of Commerce/NTIA's TIIAP grants, which require matching funds.

Finally, innovative schools and districts have also found a number of ways to raise money from local community groups, private industry, and foundations. Some have been fortunate to be chosen as model schools by businesses, others have received special grants from foundations or businesses, while others have set up entrepreneurial ventures such as reselling the instructional materials they develop. Private organizations across the country have developed a variety of programs to facilitate the use of technology and infrastructure development. These programs have ranged from school-level—for example, MCI's sponsorship of the Rosa Parks Elementary School, Baltimore, Maryland; and Bell Atlantic's sponsorship of the Christopher Columbus School, Union City, New Jersey—to national-level programs such as the AT&T Learning Network, a program under which AT&T is spending $150 million over the next 5 years to provide schools with Internet services and usage.

# part 3
# Meeting Responsibilities as Users and Creators

"[Because the] kids are exposed to large quantities of information [on the Web and are also creators], they have a healthy respect for what it takes to make information. They have a much stronger sense of what is 'theirs' and what is somebody else's [in terms of ownership of information and ideas]."—*Paul Reese, computer and technology coordinator, Ralph Bunche School, Harlem, New York*

Schools, libraries, community centers, and other institutions have long played a role in empowering individuals through information and in encouraging them to use this information in responsible and lawful ways. This role continues on the Information Superhighway.

Traditionally, schools, libraries, and community centers also play an important role in educating society. These institutions are uniquely situated to promote awareness about the legal issues involved in using the Information Superhighway and to demonstrate the importance of establishing and understanding clear policies and guidelines for participating in the Information Age. In developing flexible policies concerning browsing on and contributing to the Superhighway, it is useful to encourage schools, libraries, and community centers to keep abreast of what their users are doing on the Superhighway, at least when using their equipment, and to promote open discussion of network activities among users.

Moreover, individuals can learn how to be responsible Information Superhighway users by becoming aware of the issues involved when they create, access, receive, or transmit materials.

The Scenarios in Section 3 have been written to help illustrate some of the important issues schools, libraries, and community centers might want to explore as they enter the Information Superhighway.

## COPYRIGHT CONSIDERATIONS

Copyright law protects original works of authorship. The U.S. legal system grants copyrights not simply to reward the author for the act of creation, but to benefit the public as a whole by "spurring creativity in a free market economy while encouraging the interchange of ideas and information." Allowing authors to control the use of their works, and therefore profit financially, gives them an incentive to invest time and effort in creating new works. The more works that are created and disseminated by authors and their publishers, the richer the spectrum of material available to the public.

In the context of using and creating information on the Information Superhighway, the basic rule is simple: Copyright should be respected. If copyrights in these works are not respected, many copyright owners may be reluctant to make their works available online. Each user of the Information Superhighway is potentially also a creator, and thereby a copyright owner and a copyright user. While someone may choose to donate his or her work to the public domain or allow it to be freely used, the choice should be his or hers. Others may want to control who accesses their work and in what context, or they may have invested substantial time and money in the work's creation that they need to recover.

As a practical matter, most people, up to now, have been required to have only a passing acquaintance with the principles of copyright law. The new technologies involved in the Information Superhighway make it more important today for the general public to acquire a basic knowledge of copyright law. Even for those who are familiar with copyright law, the Information Superhighway context raises new issues. For the first time, the average person sitting at a home computer can gain access to a wide range of every type of copyrighted material and can easily copy or communicate that material virtually instantaneously. With traditional technologies, such as photocopiers, it is easy to see that a work has been copied. However, when the digital form of a work is accessed and the results are communicated electronically from one computer to another, it is not obvious to the user whether and at what point in the process a copy has been made or a performance has occurred.

Fortunately, the advent of new technologies will help users to respect copyrights. A license may often cover the proposed uses of a copyrighted work, and may be easily available. If not, if the user exercises judgment in taking only the amount of a work that is necessary for reasonable, noncommercial purposes that do not interfere with the copyright owner's market, the use may well qualify as fair use or be covered by another exemption.

In some respects, the Information Superhighway will simplify the mechanics of the copyright system. The new technology will eventually make it easier not only to gain access to a wider variety of works, but also to identify legal claims and, where indicated, who should be contacted to obtain permissions and/or make payments. It is in everyone's interest, both copyright owners and users of copyrighted materials, to make these transactions as simple and painless as possible.

### Understanding Your Rights and Responsibilities

Whenever someone uses the Information Superhighway, he or she may be using a copyrighted work and, at the same time, may be creating a copyrighted work. In both situations, he or she needs to understand what types of material are protected by copyright and what types of uses require permission. These copyright basics are an important part of the Information Superhighway's "rules of the road." The essential questions to be asked are the following: (1) Is the material protected by copyright? (2) Is the proposed use within the copyright owner's exclusive rights? (3) If so, is use permissible under an exception to those rights? (4) If not, is it covered by a license, either explicit or implied?

A more detailed explanation of these questions, and suggestions on how to answer them, is included in the "Basic Principles of Copyright" section of the Scenarios in Section 3. Also, a list of organizations and published materials that can serve as copyright resources is provided in the "Resources for Communities."

## PRIVACY AND SECURITY CONSIDERATIONS

Infringements of laws and social norms occur in everyday life and will occur in the online world, probably with about the same regularity. Schools, libraries, and/or community centers will never be able to control online activities completely—the technology and the technical know-how move too rapidly. Instead, the focus may best be placed on sensible responses to protect privacy and security. In other words, as a basic operating principle for the Information Superhighway, everyone should do the right thing, exercising common sense.

It may be helpful to view the public-private nature of the Information Superhighway as a continuum. The area of private activity is actually quite narrow, including private e-mail, especially if the message is encrypted. A less private sphere of activity includes a variety of bulletin board–type services that require passwords. But in these spheres, messages may be further divulged by another member of the bulletin board.

Most other areas of the Information Superhighway are basically public. News groups and chatgroups are accessible to anyone who subscribes. Once again, messages may be further disseminated outside the group. In addition, the account information (name, e-mail address) for subscribers to public groups and bulletin board groups is often widely available.

A theme that recurs in many of the privacy and security scenarios found in Section 3 is that the rights of minors may be different from those of adults. In the school environment, parents—and to a certain extent teachers—have certain responsibilities for a child's education that enable them to get access to a student's records and communications. The scope and detail of online activities may represent a qualitative change from the world of face-to-face contacts and paper records, but it is unclear whether this change will alter parent/student/teacher rights and responsibilities.

Everyday examples of the importance of privacy and security awareness abound. Online systems for communication of financial or medical information, for example, would probably involve serious concerns about security and data integrity. In an educational environment, school authorities would need to determine whether retention of information was warranted given the kinds of communications that are likely to dominate the system.

Additionally, schools may want to consider whether records of online computer activities constitute school records. The question becomes whether records of online activities are more similar to records of educational actions or to a trail of browsing. If online activities are more similar to browsing in the library, then divulgence of online activities may have the effect of stifling student use of the Information Superhighway and their learning through it.

For a more indepth analysis and illustration of some of the issues to be dealt with on the Information Superhighway, see the Scenarios in Section 3.

## THE IMPORTANCE OF POLICIES AND PROCEDURES

Schools, libraries, and community centers—as system operators of the online system within the institutions and as providers of access to other online systems on the Information Superhighway—need to establish policies and procedures. Educators and librarians are generally knowledgeable about the use of guidelines, as they have participated in the past development and implementation of copyright guidelines related to photocopying and off-air recording of broadcast programming. (see Copyright Office Circular 21, Reproduction of Copyrighted Works by Educators and Librarians (August 1993).) The scenarios in Section 3 are designed to illustrate where and how guidelines can be useful.

Organizations with plans to use the Information Superhighway, whether in educational or professional settings, or as a service to the public, should take the following steps:

- Publish guidelines for all who use the organization's computers and/or access online resources onsite.
- Ensure that all constituents are aware of established guidelines.
- Ask for outside advice when issues arise that go beyond the scope of the guidelines.

Simply put, develop guidelines, make them available, and take steps to ensure that users agree to and understand them before using the institution's facilities.

### *Addressing Concerns About Inappropriate Content*

While many schools are looking for ways to prevent students from accessing inappropriate material on the Internet, two school districts in Eugene, Oregon, are taking action. The Bethel School District has purchased software that limits what students can access online. With this software, a small hand pops up a warning if a student attempts to surf in areas where they do not belong. The program costs about $30 per computer, and although it cannot block out every objectional site, it will screen out most.

The Eugene School District has taken a second tack. In their middle and high schools, students only receive e-mail accounts if they have parental permission. Students who misuse those accounts lose them as well as access to the district's computer network. Students are required to apply for their e-mail account on a yearly basis.

As will be seen throughout the discussions of the Scenarios, when users enter the online world, it is not necessarily clear what spheres of activities are public, private, or semi-public. Nor is it obvious whether words, data, or pictures that one can access and download from online databases or discussion groups are protected by intellectual property laws or by privacy laws.

One of the most important things that a school, library, and/or community center can do to ensure privacy, security, and protection of intellectual property on an online system is to make clear and publicly available the policies and the circumstances under which a user might violate the policies. The advice of counsel familiar with the issues in each area of the law would be valuable in establishing frameworks to support these policies and judgments.

## MAINTAINING THE BALANCE: EMPOWERMENT AND RESPONSIBILITY

The Information Superhighway empowers its users but also carries with it responsibility. Maintaining the balance between empowerment and responsibility is not solely the job of the school, library, or community center affording access to the Information Superhighway, but also the job of each and every user and creator of the information resources upon it.

Responsibilities and rights do vary, though, depending on the role of the user, the network, and the system. A school, library, or community center should take care to clarify the role that it is playing in establishing a relationship with a user.

Many of the individuals and organizations already on the Information Superhighway are sharing stories, accessing creative material and producing their own, discussing network problems, and finding solutions every day. For anyone charged with developing guidelines for networks, online peer discussions may be helpful during the preliminary and ongoing phases. Lists of online resources for assistance with general issues are provided in Section 4. For assistance on issues that are unique to a particular situation or constituency, however, advice should be obtained from those with expertise in the appropriate subject area.

# section3

## RESOURCE ON INTELLECTUAL PROPERTY, PRIVACY, AND SECURITY

# Resource on Intellectual Property, Privacy, and Security

Institutions such as schools, libraries, and community centers have an interest in encouraging their constituents to use information in lawful and ethical ways. This interest arises not only from a concern for education or for good citizenship generally. In some circumstances, an institution that allows its equipment or facilities to be used in ways that infringe someone's legal rights may be liable for the infringement, along with the individual actually making the use. This risk is present when dealing with such rights as those based on the law of intellectual property, communications, privacy, or torts such as defamation. The extent of the risk in each case will vary depending on all the circumstances, including the institution's level of involvement, control over, benefit from, and awareness of the unlawful activity.

It is important to recognize the potential legal exposure without overreacting, and to use common sense in deciding how to respond. Institutions can perform a valuable role in educating their constituents about the legal issues involved in using the Information Superhighway, and in adopting clear policies and guidelines. In some circumstances, particularly in dealing with children, ongoing supervision may be appropriate. On the other hand, once general policies are in place, judgment calls will have to be made for each particular type of use as to what constitutes an appropriate method of supervision and whether the benefits are worth a possible increased risk of liability. The advice of counsel familiar with the issues in each area of the law would be valuable in establishing frameworks to support these policies and judgments.

In developing flexible policies concerning browsing on the Information Superhighway and contributing information, it is useful to encourage teachers and administrators to keep abreast of what users are doing on the Information Superhighway, at least when using the school, library, or community center equipment. Teachers, librarians, and community center personnel should incorporate network-related interests in the curriculum. One method might be to ask students to report on what they like to do on the Information Superhighway. Instead of leaving a student alone with decisions about the legality or ethics of sharing certain material with others in given situations, decisions that students may not yet be mature enough to make, the exchanges should become part of the student's learning experience. By encouraging the open discussion of network activities among students, teachers may have an early indication of problem areas.

For example, although many schools have strict guidelines prohibiting students from giving out personal information on the Internet, a situation could arise where a student is enticed to provide information about his community, school, or family to an entity running a homepage that appears to be a reputable company, but then proceeds to use the information for commercial purposes. In such a situation, it may be necessary for the teacher to alert the school authorities, who can obtain legal guidance on how to proceed.

Rights and interests are rarely absolute. In a classic formulation, the Supreme Court said that the right of free speech does not entitle one to shout "fire" in a crowded theater. Similarly, there may be constraints, overlaps, and conflicts between rights related to intellectual property, privacy, and security interests. For example, the ability to engage in private or anonymous communications does not mean that it is acceptable to use the ability to infringe on someone else's intellectual property rights. As computer networks extend everyone's ability to communicate and share information, there may be a tension between the exercise of those abilities and the legitimate interests of others. Administrators need to be aware of the possibility that conflicts may arise and must be prepared to take action to prevent abuses.

Section 3 is divided into two parts, the first dealing with intellectual property and the second with privacy and security. Each part first provides a primer containing basic information about these topics, then provides some hypothetical scenarios explaining how these ideas apply on the Information Superhighway. When appropriate, Intellectual Property, Privacy, and Security Principles adopted by the Council are referenced. (These principles can be found in either the Council's Policy Document or the Council's midterm report, *Common Ground*.)

## COPYRIGHT

Copyright law protects original works of authorship. These include creative works such as fiction and nonfiction writing, movies, TV and radio programs, art, music, sound recordings, databases, and computer software. Our legal system grants copyrights not simply to reward the author for the act of creation, but to benefit the public as a whole. The ultimate purpose of copyright is to expand the pool of information and knowledge available to society as a whole, by spurring creativity in a free market economy while encouraging the interchange of ideas and information. Allowing authors to control the use of their works, and therefore profit financially, gives them an incentive to invest time and effort in creating new works. The more works that are created and disseminated by authors and their publishers, the richer the spectrum of material available to the public. This benefits all of us, by promoting the progress of science and the arts.

As a practical matter, most people, up to now, have been required to have only a passing acquaintance with the principles of copyright law. The new technologies involved in the Information Superhighway make it more important today for the general public to acquire a basic knowledge of copyright. For the first time, the average person sitting at her home computer can gain access to a wide range of every type of copyrighted material, and can easily copy or communicate that material virtually instantaneously. If copyrights in these works are not respected, many copyright owners may be reluctant to make their works available online.

Public education about the meaning and importance of copyright is therefore critical to the Information Superhighway's successful implementation. It is obviously unrealistic to expect everyone to become a copyright expert, but people can learn to be responsible Information Superhighway users by becoming aware of the issues involved when they create, access, receive, or transmit materials on the Information Superhighway. This will enable them to resolve simple issues on their own and recognize when it is appropriate to seek outside help for more detailed knowledge and advice. A list of organizations that can serve as copyright resources is included in the "Resources for Communities" section.

Even for those who are familiar with copyright law, the Information Superhighway context raises new issues. With traditional technologies, such as photocopiers, it is easy to see that a work has been copied. However, when the digital form of a work is accessed and the results are communicated electronically from one computer to another, it is not obvious to the user whether and at what point in the process a copy has been made or a performance has occurred. Nor is it obvious whether a performance or display of a work at various points in the communications pathway as well as at the point of reception is public or private—a key distinction in copyright law.

The law is evolving in this area. Whether and to what extent the Copyright Act must be amended to take into account the issues raised by new technologies is currently the subject of debate. Some amendments and clarification may turn out to be advisable. Existing rights of copyright owners and creators whose works are used on the Information Superhighway should not be diminished or weakened, and should be able to be exercised in a meaningful way. At the same time, the public's ability under current law to gain access to works and make reasonable uses of them under the fair use doctrine and other exceptions to the copyright owner's rights should also apply on the Information Superhighway.

In some respects, the Information Superhighway will simplify the mechanics of the copyright system. The new technology will eventually make it easier not only to gain access to a wider variety of works, but also to identify legal claims and, where indicated, who would be contacted to obtain permissions and/or make payments. It is in everyone's interest, both copyright owners and users of copyrighted materials, to make these transactions as simple and painless as possible. On the Information Superhighway, licensing information should become more readily available than it is today. Some mechanisms are already in place that can handle licensing; other mechanisms to license online in a matter of seconds are likely to be developed.

The fundamental point is that copyrights should be respected. Each of us is potentially both a copyright owner and a copyright user. While someone may choose to donate his work to the public domain or allow it to be freely used, the choice should be his. Others may want to control who accesses their work and in what context, or may have invested substantial time and money in the work's creation which they need to recoup.

At the same time, the conditions facing users should not be difficult to cope with. A license may often cover the proposed use, and may be easily available. If not, if the user exercises judgment in taking only the amount of work that is necessary, for reasonable, noncommercial purposes that do not interfere with the copyright owner's market, the use may well qualify as fair use or be covered by another exemption.

In other words, we should all do the right thing, exercising common sense.

The use of the Information Superhighway may also raise issues of intellectual property law other than copyright. A word or logo identifying the source of products or services, such as a brand name or a school mascot, may be protected by trademark law. The names and likenesses of real people are protected against certain unauthorized commercial exploitations. And some of the electronic or mechanical components of the technology involved in the Information Superhighway may be covered by patents. The principles involved in these other bodies of law are not discussed in this document.

## FOUR KEY QUESTIONS

Whenever someone uses the Information Superhighway, she may be using a copyrighted work, and at the same time may be creating a copyrighted work. In both situations, she needs to understand what types of material are protected by copyright, and what types of uses require permission. These copyright basics are an important part of the Information Superhighway "rules of the road." The essential questions to be asked are the following: (1) is the material protected by copyright? (2) is the proposed use within the copyright owner's exclusive rights? (3) if so, is it permissible under an exception to those rights? and (4) if not, is it covered by a license, either explicit or implied?

### 1. Is the Work Protected by Copyright?

Some materials that can be found on the Information Superhighway are protected by copyright, and some are not. Copyrights are withheld from certain works for policy reasons; other works have lost their copyrights because of a failure to comply with past legal rules, or because the works are so old that the copyrights have expired. Two general categories of works that are likely to be in the public domain, and therefore free to be copied, are works created by the U.S. Government, and works that were published more than 75 years ago. For many works, unfortunately, there is no simple way to tell. The answer depends on a variety of facts such as who created the work; when, where, and how copies of the work have been distributed to the public; and the date of the author's death. For most newer works, the copyright will last for 50 years after the author's death, or 75 years after publication. If it is important to know the status of a particular work, legal advice should be obtained.

Although copyright owners often use a notice of copyright, and/or register claims in their works with the Copyright Office in Washington, D.C., they are not required to do either under current law. So the fact that a work has no notice on it and does not show up in the Copyright Office's records is not a guarantee that it is in the public domain. A wise approach is to assume that material is protected unless you have reason to believe that it is not.

This is true even for works from other countries. Foreign materials found on the Information Superhighway will often be protected by copyright in the United States. Our law protects works that come from other countries with whom we have a treaty or other copyright relations, in return for their willingness to protect American works within their borders. It is only a small handful of countries today with whom the United States has no such relationship, and whose works are therefore not protected here.

As a creator of material in digital form, the Information Superhighway user may become a copyright owner as well. Often someone using the Internet inputs his own thoughts in the form of an e-mail message, or by posting material to an electronic bulletin board. This material, if it is original with the creator, and has at least a minimal amount of creativity, will be protected by copyright. Even some less visible types of creative expression are copyrightable. For example, selecting from a group of preexisting materials, and combining or arranging them in a manner that requires thought and judgment, may itself result in a copyrightable work (assuming the use of the materials does not infringe any copyrights).

Moreover, any work created while using the Information Superhighway is automatically protected by Federal copyright law as soon as it is fixed in the computer's memory. The creator does not need to apply for a copyright, register the creation with a government office, or even place a notice of copyright on it. The result is that she can, if she chooses to do so, prevent others from making various unauthorized uses of the new material.

## 2. Is the Use within the Copyright Owner's Rights?

Finding out whether a work is protected by copyright is only the beginning. A copyright does not give a monopoly over all of the work's contents. Ideas or facts cannot be protected by copyright, and, absent other legal considerations, can be taken directly from a copyrighted work. What is protected is the author's creative expression—the choice of language used to describe the ideas, not the ideas themselves.

In addition, not all types of uses of copyrighted material require the owner's consent. For example, a purely private display or performance of a work is always permitted. Simply looking at a work is not an infringement. The acts that the copyright owner is legally entitled to control are the making of copies, the distribution of copies, the use of the work as the basis for a new work, and acts of public performance or public display.

Most uses of a work on the computer, however, are likely to involve one or more of these acts—sometimes in ways that are not obvious. For example, it is important to understand that copies can be made in many ways, not only by the use of a printer or photocopier, or by pressing a function key. When information in digital form is communicated from one computer to another, it can be argued that a copy occurs in the receiving computer. Some legal questions surrounding copying in the electronic environment have yet to be resolved. (Technically speaking, an exact replica of the information as it existed on the first computer will not generally occur. In particular, the bits may manifest themselves differently on the receiving computer as a result of software operations within both computers, as well as other transformations that may occur in between. Nevertheless, a copyright owner's rights may still be implicated.)

## 3. Is the Use Permissible under an Exception to the Copyright Owner's Rights?

There are a number of exceptions to the copyright owner's rights—situations where conduct that interferes with those rights is permitted because Congress or the courts have determined that the conduct is justified even without permission or payment. Where appropriate, these exceptions should apply in the Information Superhighway.

The most important exception is fair use. Fair use is a flexible doctrine, intended to allow uses that are reasonable and beneficial to the public without requiring the copyright owner's consent. Whether a particular use qualifies as fair is based on an evaluation of all the circumstances. This includes a balancing of four factors set out in section 107 of the Copyright Act: (1) the purpose and character of the use, including whether it is commercial or for nonprofit educational purposes; (2) the nature of the copyrighted work; (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work. The complexity of this balancing, and its fact-specific nature, make outcomes hard to predict. There are, however, some generally accepted interpretations of the fair use doctrine. For example, the Supreme Court has held that it is a fair use to copy a free broadcast television program at home on your VCR in order to watch it at another time. The classic example of fair use is the quotation from a book in a book review, in order to illustrate the reviewer's point. In less clear circumstances, particularly if the stakes are high because of the time or money involved, or the extent of dissemination of the line, it would be advisable to obtain legal advice.

The availability of reasonable licensing arrangements may be weighed in determining whether a particular use is fair. Efficient and inexpensive means of identifying and locating copyright claimants using network capabilities is essential to encourage new and creative uses.

It is a common misconception that copies or performances made for personal use, or for nonprofit educational use, or for research, are always permitted. The reality is that such uses may be permitted, when they fall within a specific exemption or qualify as fair use, based on an examination of all the circumstances. The personal, nonprofit, or educational nature of the use will, however, strengthen a fair use claim.

Other exceptions to the copyright owner's rights are more specific and detailed. The law contains provisions, for example, dealing with library copying for interlibrary loans, secondary transmissions of broadcasts by cable companies, and the making of a single copy of a computer program for archival purposes. Although there is no general exception permitting all nonprofit or educational uses, a number of provisions exempt certain specific uses of this type. All of these exceptions may be found at sections 108-120 of the Copyright Act.

## 4. Is the Use Covered by a License?

For many works that are available on the Information Superhighway, it will be possible to get a license from the copyright owner allowing use of the work. As a general rule, it is up to the copyright owner to decide whether or not to grant a license; he has the option of simply saying no. Payment or credit alone is not a substitute for permission. But as a practical matter, if the work has been made generally accessible on the Information Superhighway by the copyright owner, he may be willing to disseminate it further—particularly for a typical individual use by a member of the public.

Licenses may be obtained in many different forms. The easiest case is the general license, where a copyright owner announces to the world that anyone is free to use the work in any way. Some uses of works on the Information Superhighway by individuals will be covered by licenses already in place through service providers. For other uses at locations such as libraries, community centers, and schools, it will be possible to obtain "site licenses," allowing specified uses by multiple users located on site. In addition, some types of use can be licensed for many works at once through organizations set up by groups of copyright owners to administer their rights. And a license can be requested for a single particular use, either through traditional communications media or online. It is also possible to associate simple terms and conditions with the data itself as well as procedures for locating and accessing such data on the Information Superhighway. Finally, permission to use a work may be implied in appropriate circumstances.

Who has the right to grant a license? For users of the Information Superhighway, the answer will be clear in most cases from information posted on the work itself. When creating a work on the Information Superhighway, the answer will be more complex if more than one person participates in the creation process. Sometimes the owner will be the person or business who paid for the work to be created, rather than the actual creator. For example, if an employee creates a work as part of her job, her employer will own the copyright and she cannot use it herself without permission. And if several people work together to create a single work, they may be considered coauthors, jointly owning the entire work. If so, each would have the right to license the work without the others' consent (assuming they shared any profits with them). In addition, copyright rights can be sold or given away voluntarily to new owners.

To assist school administrators and teachers, librarians, and community center personnel who may actually confront situations involving these principles, the following scenarios and discussions are provided. This material is intended only to sensitize Information Superhighway users to the issues and to provide a general framework for resolving them. These analyses are not intended as a substitute for obtaining legal counsel when necessary.

## COPYRIGHT SCENARIOS AND DISCUSSION

### 1. Creation of Multimedia Works Using Online Materials

*A class studying American history is assigned to "surf the Net" and put together a multimedia "collage" of materials on a topic of their choice. This collage may take the form of a computer program that is based on or incorporates preexisting works. The Internet offers a variety of resources for them to use, including textual databases, film footage, photographs, and sound recordings that have been converted into various digital formats. What should the teacher tell the class with regard to protection of intellectual property? What are the students' rights in their own work product?*

*The first issue raised by this scenario is whether the materials the students are using to create their collages are protected by copyright. Unless the materials are clearly in the public domain, or explicitly state that they are dedicated to the public, the answer is probably yes.*

*The fact that the materials are protected by copyright doesn't necessarily mean that the students can't use them. The next issues to address are what type of uses the students will make of the materials, and whether those uses are covered by a license.*

*There are several uses that the students may make of the materials without legal risk. Uses that do not involve copying the materials or performing or displaying them publicly are generally permitted. For example, assuming access is permissible under other bodies of law, a student may review an archives table of contents to determine what material is available. In addition, he should be able to search for, and obtain a list of, particular material he is interested in through the use of queries or key words.*

*Other uses are less clear. The students will probably wish to access the materials they have found. Doing so may entail the making of a copy in the computer's memory, even if that copy is not permanently retained. Depending on the terms under which the materials have been placed on the Internet, this type of transient internal copying might be considered fair use, or permitted by an explicit or implied license, since it is necessary in order to interpret the data and manifest the results.*

*What about printing out single copies of textual items, solely for the students' personal use to refer to and take notes on in the process of working on their projects? And finally, what about incorporating portions of the materials into the final collages? These acts may involve not just storage in memory but possible interpretation and other manipulation by computer programs of the information in various digital formats. If a substantial amount is copied, permission will be needed unless the use falls within an exception to the copyright owner's rights.*

*The most obvious exception to consider here is fair use. The students are making the copies for nonprofit educational purposes, which will help in the overall balance. The fair use claim may be particularly strong with regard to the use of small portions of works, or printouts made purely as a matter of convenience in order to avoid taking notes directly from a display on their computer screen. In any event, individual printouts for personal purposes may be covered by the license giving access to the archives.*

*This scenario, like those that follow, also raises issues of secondary liability for the institution where the acts take place. It would be advisable for the school to have guidelines in place on how to handle copyright issues, particularly when the teacher is giving an assignment that specifically envisions the copying of copyrighted material.*

*Another set of issues relates to the students' rights as authors of their collages. If the collages are made lawfully, they will be protected by copyright as soon as they are fixed on paper or in the memory of the computer. In most cases, the students' copyrights will protect the creative judgment they used in choosing what materials to include, and in deciding how to combine and arrange them. Likewise, in most cases, the students will have the right to prevent others from copying substantial portions of the collages without their consent. The copyrights in the collages will not, however, give the students the right to prevent copying of the preexisting materials themselves.*

## 2. Downloading of Copyrighted Images

*The director of a community center learns that teenagers regularly use the computer terminals at the center to access copyrighted pictures that have been converted into digital form, storing them in personal file areas to which only they and he have the passwords. What should he do?*

*This scenario raises issues of both intellectual property and privacy. "Accessing" pictures in digital form is likely to involve acts that potentially infringe copyright; when the data are downloaded by the teenagers into the computer's memory, data representing the works will be stored in the files. Unless the owner has granted a license covering this use, the copying may constitute infringement. The fair use doctrine is unlikely to apply where entire works are copied for purposes of entertainment, as a substitute for purchasing them from the copyright owner.*

*The community center's role here is more passive than the school's role in the first scenario. Assuming that the center is doing no more than providing equipment, which is capable of significant noninfringing uses, and is not requesting or encouraging the teenagers to access and store copyrighted material, it is unlikely to be found liable for the teenagers' acts. The advance posting of a clear copyright policy would put the center in a better position. On the other hand, a decision to supervise the teenagers' uses might increase the center's risk of liability. And once the center staff becomes aware of infringing uses, it should take action to prevent them in the future.*

## 3. Use of Library Computer Terminals

*A local public library sets up a computer room filled with computer terminals. Library patrons can use the terminals to watch movies and listen to music on videotapes and CDs purchased by the library. They can also run software programs, and download and print copyrighted materials from databases. The library has site licenses for these programs and databases. What types of policies should the library adopt with respect to intellectual property concerns?*

*The use of a terminal to watch a movie or listen to music on a videotape or CD placed in that terminal involves the performance of a copyrighted work. If a performance is private, it does not infringe the copyright in the work; if it is public, it may. The question is whether the performance is public or private when an individual patron views, hears, or executes the work on a computer terminal in the public library. If the patron took a movie home and watched it on her home computer, there would be no problem. But because the library is a place open to the public, the performance could be considered public, and therefore potentially infringing. It is possible that one of the specific exceptions to the copyright owner's rights would apply here, but the application of these exceptions to the online environment is not yet clear.*

*As to the use of databases and software, the question is what acts are covered by the library's licenses. Software licenses may specify a particular number or group of people who are authorized to use the software. In order for the downloading from a database to be lawful, the license must permit accessing some or all of the data to perform operations such as printing, executing, and viewing.*

*Most database licenses do permit the downloading or printing of individual items, or of reasonable amounts of these items.*

## 4. Electronic Mailing Lists and Use of Copyright Notices

*A current events discussion group meets weekly at a neighborhood community center. The group decides to establish an electronic mailing list of friends and acquaintances around the country. Once a week, it will send to the mailing list their own compendium of entertaining news items from the press, with its own humorous comments on each one. Can the discussion group lawfully create and distribute the weekly compendium? Can it place restrictions on the uses that others may make of the compendium, such as prohibiting them from making any changes? On the other hand, can it disclaim any copyright rights and place the work in the public domain?*

*The facts of the news themselves cannot be protected by copyright, and thus anyone is free to repeat them. However, the language of the article that reports the news in the press is usually copyrightable expression. Whether or not the discussion group is infringing copyrights in the news items will depend on the nature of the material included and the use they make of the compendium. If they create the compendium only for their own amusement, they may be engaging in a fair use. The more widely the compendium is disseminated and the more commercial the dissemination, the less likely the use is to be excused as fair.*

*Assuming that there is no infringement, the compendium itself may be copyrightable, since it is created through the use of selective judgment as to what news items to include from a vast pool and contains original humorous comments. As soon as each compendium is fixed in the memory of a computer, it is automatically protected by Federal copyright. Since the compendium is a single work merging their individual contributions, those members of the discussion group who contributed creative authorship may be joint authors.*

*As copyright owners, the discussion group would be able to bar the copying of the compendium without authorization. Although the law does not require it, it would be helpful to place a copyright statement on the screen to let users know that they do claim rights. On the other hand, one is always free to make one's work available to others if one wishes to do so. Again, a simple statement on the screen to that effect would suffice.*

*It may also be possible to place conditions on the use of one's work even beyond the limitations imposed by copyright law. As a matter of contract, one could tell Internet users when they access the material that they may only use it in specified ways as a condition of access. While the law is not entirely clear, such contracts may be enforceable.*

## 5. E-Mail Discussion Group

*At the suggestion of their teachers, students at several schools in different States establish an e-mail discussion group on the topic of the government's role in education. What are the rights of the participants in their contributions to the discussion?*

*Copyright protects all types of authorship, from the formal structured book published in an edition of tens of thousands to the informal, short note that someone sends to a friend. Any form of expression, as long as it is original with its author and minimally creative, is protected by Federal law as soon as it is fixed in a tangible form. This means that individual comments contributed to an e-mail discussion may be protected by copyright. Accordingly, permission is needed to make copies or to perform and/or display the work publicly, whether done electronically by forwarding a digital version of the work to another person's computer or posting it on an electronic bulletin board, or done the old-fashioned way by printing it out on paper and posting it on a cork bulletin board.*

*On the other hand, permission does not have to be formally requested and formally granted. By participating in this type of discussion group, the student may have given his implied consent to sharing his thoughts, at least to some extent. The question is whether that consent extends beyond the circle of the discussion group, and if so, how far. There may be a difference, for example, between forwarding the message to other students who would be eligible to join the discussion group, and forwarding it to a broader audience.*

## 6. Digitizing and Uploading Print Material

*You are the adviser to the high school newspaper. A student editor digitizes an article by a parent that appeared in the newspaper, along with a cartoon created by another student to illustrate the article, and places both of them on an electronic bulletin board on the Internet, from which they can be downloaded by any subscriber. What policies should the newspaper adopt to deal with this type of situation?*

*First, it would be wise to adopt a policy assuming that new and original works of authorship such as the article and the cartoon are protected by copyright. Protection exists whether or not the parent writer or student artist took steps to claim copyright, by using a notice or registering a copyright claim in the work, or even knew that the work was protected by copyright.*

*Second, the newspaper should flag the possibility that this type of use may infringe. Several courts have held that either unloading material onto an electronic bulletin board, or downloading material from such a bulletin board, constitutes copyright infringement. In addition, the digitizing itself may be considered to infringe.*

*Finally, the student staff should be directed to look at the scope of the newspaper's license. While the parent and the student artist have presumably given the newspaper permission to publish the article in paper form, that permission doesn't necessarily extend to the online environment. Depending on what was said and understood, permission may have been limited to publication in the newspaper, to be distributed to its ordinary circulation at the school.*

## 7. Distance Learning

*A teacher demonstrates to her class how to use various word processing programs. The programs are licensed for her computer. Information sufficient to recreate the screen displays is communicated to students at a distance learning site on personal computers, which are linked to hers via a wide area network. Should the school allow this use of the programs?*

*Computer programs such as word processing programs are copyrightable works. The first question raised by this scenario is whether any of the copyright owner's rights have been infringed. Again, it is necessary to look to the scope of the license. The teacher's license allows her to use the software on her own computer. When the screen display information is shared with the other personal computers, however, copies may be made of portions of the programs in the computers' memories to the extent that the copies incorporate renderings of the original programs. If this additional copying is not authorized by the license, it may constitute infringement as well as breach of contract.*

*In addition, the communication may infringe the copyright owner's rights of public performance and display. A performance or display of a work is public, and therefore within the copyright owner's control, when it is communicated to members of the public by electronic means, even if they receive the performance or display in separate places and at separate times.*

*The school should look into the possibility that one of the Copyright Act's exemptions might apply. When the communication of a performance is done as a regular part of systematic instruction for a nonprofit educational institution, it may be permissible even without the copyright owner's consent. The performance may also qualify as fair use, upon consideration of all the circumstances.*

## 8. Library Preservation and Updating of Materials

*A library wishes to adapt to and take advantage of modern technology. It makes digital copies of those books in its collections that are beginning to deteriorate physically, in order to preserve them. The original paper books are kept on the shelves. The library also "refreshes" those works it acquired in digital form. This involves making an exact replica of the original and transferring it to the latest storage media, as well as updating the* *electronic storage format for use by newer operating systems and retrieval software. The library does not retain the old versions of the digital works, so that it does not end up with more copies than it originally acquired. Are these acts by the library lawful uses of the works it has purchased?*

*The fact that the library has purchased the initial copies of these works does not mean that it is free to make additional copies. Ownership of a physical copy of a copyrighted work does not carry with it the ability to exercise the copyright owner's rights. Moreover, there is no general exemption permitting all uses of copyrighted works by public or nonprofit libraries.*

*The copyright law does, however, contain a specific exemption for libraries, allowing them to do a number of things that would otherwise constitute infringement. The library should check this exemption, and determine the extent to which it covers these activities. In the traditional paper-based world, some but not all of the acts of copying in this scenario would be permitted under the exemption. The extent to which the exemption should be extended to allow similar preservationist and archival copying in the digital environment is still unsettled.*

*Even if the exemption were not extended to digital copying, or for those acts of copying that wouldn't be covered by the exemption, the library may be able to invoke a fair use defense. A court would consider the noncommercial, limited nature of the copying, as well as the extent to which the library's use would substitute for a new purchase from the copyright owner.*

## 9. Digital Manipulation of Copyrighted Materials

*A student working at the school computer lab searches through a database on the Internet. She finds a magazine article on the subject of violence in the schools, illustrated by several photographs. As a prank, she changes the references in the article from a center-city neighborhood to the suburbs where she lives, and combines two of the photographs to depict a cache of a frightening assortment of weapons placed on the front steps of her own school. She then transmits the modified versions to her friends at school, and posts them on an electronic bulletin board, without indicating that any changes have been made from the originals. How should school administrators respond?*

*This scenario involves the manipulation of data and material protected by copyright in a way that is misleading. The ease of such manipulation in the digital environment is one of the major differences from more traditional means of communication.*

*Recipients of manipulated materials will not get what they think they are getting. Depending on the nature of the data, the dissemination of inaccurate data may lead to real personal or economic harm.*

*As a legal matter, such manipulation may violate copyright and other laws. Where the materials are protected by copyright, the copyright owner is losing control of the content of the work, which may among other things affect its reputation and hurt its future market. One of the copyright owner's exclusive rights is to create new, derivative works* *based on the original. An unauthorized manipulated version of the original would likely be considered to violate that right. In addition, other State and Federal laws may protect the author of the original article and the photographer from having their works changed without their consent, and then published misleadingly above their names.*

*Again, the circumstances of the use may change the legal outcome. A manipulation that is intended as a joke or humorous comment might be permissible as fair use in appropriate circumstances. A fair use claim would be strengthened if the manipulated version was circulated, without any charge, to only a few friends.*

*One possible eventual technological solution may be the use of digital signature to validate the accuracy and integrity of material obtained online. In any event, students should be educated as to the potential negative consequences of what may seem to be a harmless prank.*

## 10. Performance of Downloaded Music

*A high school has a student-run radio station, that transmits only within the school building. Instead of purchasing records, cassettes, or CDs for transmission over the air, the students decide that they will download songs from an interactive online service. When asked for advice about whether licenses are necessary, how should school administrators respond?*

*Two separate copyrighted works are involved in this scenario: the musical composition, and the recording of the particular performance of that music—i.e., the combination of recorded sound that makes up what is known as the "sound recording."*

*First, when the students store the songs from an interactive online service, they are making reproductions of both the sound recordings and the underlying musical compositions. These reproductions may require licenses from the copyright owners of both works. Moreover, when music is played over the air in the school, a public performance takes place. Even though the school building may not be open to the general public, it contains a substantial number of people beyond the normal circle of a family and its friends. Although the law does contain various exemptions for public performances for educational purposes, they are generally limited to performances as part of a regular course of instruction.*

*The students will therefore need to obtain licenses for the public performance of the music. Such a license is easy to obtain, for a fee tailored to the nature of the user (i.e., its size and its commercial or nonprofit character), from collection organizations set up for that purpose by music copyright owners. The students will not, however, need a license from the record producers to perform the sound recordings, unless they perform the sound recording digitally on an interactive service or as part of certain kinds of subscription services.*

## 11. Enterprising Student as Service Provider

*An enterprising student, wishing to be the local supplier of weather information for the school library, writes an interactive computer program that accesses various digitized materials on the Information Superhighway such as maps, unprocessed data from weather sensors, and government historical information. The program is continually refreshed and provides an informative and entertaining presentation on current and historical weather patterns. Can the program be run by the school library without obtaining further permissions? Can the student make the program available to the local TV station or others for use by the public? What policies should the school adopt to cover situations such as these?*

*The weather analysis generated by the student's computer program may or may not incorporate any preexisting material subject to copyright. The output would probably be more than simply information stored in a database. Whenever the program is asked to predict the weather, the resulting analysis would represent the results of a performance of the program created by the student, and, if the performance is embodied in a local TV broadcast, this may constitute a public performance for copyright purposes.*

*As to the preexisting data incorporated in the program, such as the unprocessed data from weather sensors and government historical information, much of it may constitute unprotectible facts or be sources from the Federal Government, and therefore is likely to be in the public domain. The copyright status is less clear, however, if the student links in to a commercial service to access the data. The problem is that the student may get some of the data in the program from an independent private source that has manipulated it in such a way as to create a new version, in itself subject to copyright (such as an interactive weather map). It then becomes difficult to separate out the preexisting unprotectible material from the newly added authorship. Moreover, once the student's program has further manipulated the data, it may be difficult to determine what data came from what source.*

*There may also be cases in which, while the data itself is in the public domain, commercial entities provide access to the data in real-time in exchange for a limited time duration license on its use. Thus, if the program is updated in real-time using a commercial provider of the weather data, caution must be exercised to ensure that accessing that data does not violate the provider's license from the government or others.*

*Often, permissions may be obtained, free of charge, to use preexisting information, provided that credit is given to the source. This basic courtesy is often required by contract even where the activity in question may be a fair use or otherwise covered by some exemption. Teachers supervising use of school equipment should be aware of student activity, however, since copyright payments and other fees may be associated with access to various repositories of information, and the school may be liable for such payments. To avoid potential controversies, a school should develop policies relating to student-generated works that are widely publicized.*

*Finally, since the program may be asked for predictions on which people may rely as a basis for making judgments or decisions that could have important consequences in their* *lives, there could be noncopyright liability issues relating to the source and accuracy of the content.*

## 12. Use of Works from Unknown Sources

*A student using one of the school's workstations obtains several pieces of software from the Internet and adds code of his own to form a novel agent-based program. Given queries from other students, the program generates and launches software agents into the network which return with information collected and preprocessed by the agents. The student's program integrates the information and stores the result in a database operated and maintained by the school which the students can use at their leisure. Is the school entitled to run such a database for use by the students? Can it make the database accessible throughout the school district? What rights do the student and the school have in the program or the database?*

*Since school equipment is being used, it is advisable to instruct students on basic copyright principles and alert them generally to the need to obtain prior authorizations. The application of the doctrine of fair use to the acquisition of various software elements from the Internet is as yet undeveloped. Absent security mechanisms to prevent or inhibit access to program elements, it is at least arguable that this activity may be permissible in certain cases. For example, there may be an implicit authorization for contacting and manipulating other network software by a remote agent where the program is designed for such agent manipulation and is publicly accessible on the Information Superhighway.*

*However, until the situation is clarified, a school should exercise caution in facilitating this activity.*

*While there are important patent, communications, and other issues that should be addressed in connection with works expressed as sequences of binary digits (or "bits"), from a copyright perspective the student's activity raises legal questions. For example, in the event substantial portions of preexisting programs are incorporated in the student's agent-based program, and provided that these program elements are protected by copyright, it is necessary for the student to obtain permission before making the derivative work. Further, since the program will generate and launch software agents in the network, permissions to perform the underlying program elements in public may also be required.*

*Again, the analyses of copyright considerations in the above scenarios are not intended as a substitute for obtaining legal counsel when necessary.*

Rights and responsibilities in the online environment are still evolving. In making decisions in this largely uncharted world, common sense is still a good guide. Although an analogy to the world of paper records and face-to-face contacts may not always provide a definitive answer to questions about the online environment, it does provide a good starting point. The scope of legal protections, both statutory and constitutional, for online activities is not settled. Our discussions of the scenarios are not meant as "legal advice" but as issues that should be considered.

A general principle that may help guide schools, libraries, and communities in responding to questions and problems that occur when providing access to online systems is to respond based on the norm rather than the exception to the norm. Infringements of laws and social norms occur in everyday life and will occur in the online world, probably with about the same regularity. Schools, libraries, and community centers will never be able to control or sanitize online activities completely—the technology and the technical know-how move too rapidly. Instead, the focus may best be placed on sensible responses to protect privacy, security, and intellectual property.

In providing access to online systems, schools, libraries, and community centers can assume different roles, such as system operator, provider, moderator, and contractor with system operator. Responsibilities and rights vary depending on the role. The school, library, and community center should take care to clarify the role that it is playing in establishing a relationship with a user. Organizations providing online access to others must recognize inherent tensions between freedom and responsibility. As the degree of supervision increases, legal liabilities for system operators may arise, and the freedom of users may be restricted. On the other hand, increased freedom and anonymity may make it more difficult to regulate the online world and may increase conflicts between users and overlapping policy goals. In balancing competing interests, the principles on privacy and security adopted by the Advisory Council offer a guide to the development and deployment of an effective Information Superhighway.

As will be seen throughout the Scenarios, one of the most important things that a school, library, or community center can do to ensure privacy, security, and protection of intellectual property on an online system is to state clearly and publicly what the policies are and how a user might violate the policies. When users enter the online world, it is not necessarily clear what spheres of activities are public, private, and semi-public. Nor is it obvious whether words, data, or pictures that one can access and download from online databases or discussion groups are protected by intellectual property laws or by privacy laws. Schools, libraries, and community centers will play a vital role in educating users about such issues.

It may be helpful to view the public-private nature of the Information Superhighway as a continuum. The area of private activity is actually quite narrow, including private e-mail, especially if a message is encrypted. The Electronic Communications Privacy Act prohibits any intentional interception or disclosure of e-mail messages. An important exception to this is that the system operator—including schools, libraries, and community centers—can read private messages under certain circumstances. A less private sphere of activity includes a variety of bulletin board-type services that require passwords. But in these spheres, messages may be further divulged by another member of the bulletin board. The private nature of these spheres is somewhat illusory. Most other areas of the Information Superhighway are basically public. Newsgroups and chatgroups are accessible to anyone who subscribes. Once again, messages may be further disseminated outside the group. In addition, the account information (name, e-mail address) for subscribers to public groups and bulletin board groups is often widely available.

Schools, libraries, and community centers—as system operators of their own online systems and as providers of access to other online systems on the Information Superhighway—need to decide whether to set up the online system with audit trails that would capture and retain information about online activities. In systems where security and data integrity are important concerns, it is a good use of resources to establish audit trails and retain detailed records. For example, users of online systems for financial or medical information would probably be concerned about security and data integrity. In an educational environment, school authorities would need to determine whether retention of information were warranted given the kinds of communications that are likely to dominate the system. They may also want to consider their potential responsibilities if information is retained. If information about online activities is not retained, then the school will avoid decisions about to whom information should be released. The question becomes whether records of online activities are more similar to records of educational actions or to a trail of browsing. If online activities are more similar to browsing in the library, then divulgence of online activities may have the effect of stifling student use of the Information Superhighway and learning through it.

A theme that recurs in many of the privacy scenarios is that the rights of minors may be different from those of adults. In the school environment, parents and teachers have responsibilities for a child's education that enable them to access a student's records and communications. The scope and detail of online activities may represent a qualitative change from the world of face-to-face contacts and paper records, but it is unclear whether this change will alter parent/student/teacher rights and responsibilities. A second area in which the rights of children are different concerns access to "adult materials." While the First Amendment protects the sale and distribution of materials that are not obscene, it does allow communities to take actions that restrict children's access to such materials.

# PRIVACY AND SECURITY SCENARIOS AND DISCUSSION

## 1. Restriction of Computer Use by Schools

*A school wants to establish a policy that school computers can only be used for class-related work. The school does not want students using computers for entertainment (e.g., games) or for inappropriate or illegal activities (e.g., gambling, drug deals, sex chats). Can the school establish and enforce this policy?*

*In general, it is within a school's authority to establish a policy restricting the use of computers. The school's mission is to educate, and the school's computers are school property. The school can establish restrictions consistent with its educational goals.*

*School authorities should be sensitive to how broadly or narrowly to define the restrictions. For example, does "class-related" mean that online access is limited to specific class projects, or can it include anything of educational value? Guidelines should be clear so that students understand before going online what is and is not permitted. The guidelines might be posted at each computer terminal and could appear onscreen when students log on.*

*Restrictions can be enforced by both technical and administrative means. School authorities should consider the kind of online environment they wish to provide. There are software packages and other techniques to guide or limit student access. When students enter the Information Superhighway, there will be access points that require passwords or account numbers. The school, either in contracting with a system operator or serving as system operator, can specify the online services that students may access.*

*Additionally, school authorities can monitor the accounts of students in different ways (what databases have been accessed, what bulletin boards are frequented, recipients and content of e-mail). It is at this point that schools need to be sensitive to privacy concerns. In determining the degree or level of monitoring, two factors are important. First, users should be told in advance what is being monitored so that they can decide how to use the system. Second, constant or invasive monitoring is likely to result in fewer communications, and users may be restrained in expressing themselves. School authorities need to balance their interest in restricting use with their interest in encouraging students to take advantage of the online environment and to communicate freely within that environment. Protection of privacy is crucial to encouraging free speech and to realizing the full potential of the Information Superhighway.*

## 2. School's Release of Record of Online Activities

*A parent asks to see the records of her son's online activities. Should the school divulge those records to the parent? What if a teacher, the PTA, or law enforcement officials want to see records of students' online activities?*

*Schools may choose not to keep detailed records of online activities. If the school retains records of students' online activities, then parents can legitimately request to see those records. In general, the parent is entitled to see school records of a child. The school could* *divulge the records unless the school, system operator, and user (student) had agreed upon a different level of privacy for online communications and related records. Parents of minor children also may need to be a party to the agreement.*

*If a teacher asks to see the records of a student's online activities, the school should evaluate the educational relationship between the student and teacher. If the student is in the teacher's class and the teacher wants the records to evaluate the student's progress, then the school can make the records available without compromising a student's privacy. If appropriate notice has been given, the student will have an expectation that the records would be available to teachers. This does not necessarily mean that any teacher can ask for the online records of any student in the school. An educational relationship between the student and teacher is a reason for access. If a teacher were interested in a schoolwide study of student use of online systems, a summary report could be provided that did not identify individual students.*

*If the PTA seeks records of a particular student, a different privacy issue is raised. The 1974 Family Educational Rights and Privacy Act gives parents and students the right to see student records and restricts other disclosures without parental consent. Under existing law, the disclosure of personally identifiable records of online activities to the PTA or to another parent would be illegal without the consent of a student's parents. If the PTA wants to examine online activities of the student body as a whole, the school could provide a summary report that did not identify individual students.*

*If law enforcement officials ask to see the records of a particular student's online activities, school administrators would want to ensure that the officials were acting with the appropriate authority, as discussed in the following scenario.*

## 3. Online Solicitation of Student

*A student disobeys classroom rules and enters inappropriate chatrooms online. Also disobeying school rules, the student gives her real name rather than the online name given to her in school. As a result, an adult user begins sending sexually aggressive messages and calls the child at home. The child's parents claim the school is responsible for threatening the child's security. What is an appropriate response?*

*Schools and system operators need to be cautious and alert about the possibility that students can make inappropriate contacts or access undesirable materials online. Schools that establish policies restricting use of computers to classroom activities and requiring students to use pseudonyms arguably have taken reasonable steps to protect students from solicitations that may occur on adult chatlines. Other activities include increased monitoring in response to an identifiable problem. Schools can also warn students, in much the same way that generations of children have been warned about the dangers of talking to or riding with strangers. With appropriate rules and supervision, a school may fairly argue that it is not responsible for willful violations of its rules.*

*Parents could also be informed about the school's online policies and the reasons for the restrictions. Parents could be told about the possibilities of their children accessing inappropriate areas in the online world and be given guidance as to how to advise their* *children. In this way, the school would be playing an important role in public education about the Information Superhighway and its potential effect on individual privacy.*

*Such incidents may occur even if students use their username rather than their real name. In 1994, a man was charged by Massachusetts police with raping teens and preteens after luring them through a computer bulletin board. System operators who make obscene, pornographic, or indecent materials available on their systems are vulnerable to legal challenges, especially if material can be accessed by minors. Operators of such bulletin boards or chatrooms often follow the FCC's dial-a-porn regulations for telephone services. These require reasonable efforts to ensure that each user is at least 18. This may entail written verification of age. Some systems use a special access code, and others scramble or encrypt all indecent materials.*

## 4. Law Enforcement Access to Records

*Law enforcement authorities believe that a student has been using e-mail to conduct drug deals both within the school and with students in other schools. They ask to see the stored e-mail and records regarding the student's use of the computer. They also ask to monitor the student's online activities in real-time. When can school officials respond to requests from law enforcement authorities for online records?*

*School authorities should only reveal student records if the law enforcement officials produce a warrant. The kind of warrant required depends on the material sought. The Electronic Communications Privacy Act (ECPA) requires officials to obtain a warrant to search or seize stored electronic communications that are less than 180 days old. If the e-mail is stored for more than 180 days, then law enforcement officials just need to obtain an administrative subpoena. Under ECPA, law enforcement officials also need a warrant to obtain information about the student's use of the computer. Without a warrant or court order, school officials should not respond. If the school limits its retention of backup information on student computer use, then it will have less information that others may want to access.*

*If law enforcement officials ask to monitor real-time transmissions, they have to produce a special warrant that specifies the criminal activities, sources that implicated the individual, and the specific system they wish to monitor. This scenario would play out similarly if law enforcement officials approached a library or community center and if they were seeking electronic records related to any criminal activity, e.g., gambling, conspiracy, embezzlement, or selling of obscene material.*

*If students are communicating on public areas of online systems, then law enforcement officials can, and do, go "undercover" and monitor discussions. Students should be informed that they have no Fourth Amendment expectation of privacy, or any statutory protection through ECPA, on those systems. In general, a school should make clear the differing levels of privacy expectation that exist on public, semi-public, and private systems. These distinctions are difficult to intuit but important for students to realize.*

*This is one area where the legal answers for the online environment are relatively straightforward. ECPA, which gives statutory meaning to the Fourth Amendment* *protection for persons, houses, papers, and effects against unreasonable searches and seizures, defines rights for individual users and responsibilities for system operators and law enforcement officials. If a system operator revealed user records without proper authorization, then the user could sue the operator. If law enforcement seized or searched records without a warrant, then the evidence gathered would be inadmissible in court. It is therefore in everyone's best interests if law enforcement officials appear with the appropriate legal authorization.*

## 5. Casual Overseeing of Inappropriate Material by Children

*At a library or community center, a member of the public asks to use a public terminal to establish an e-mail account. This person wants to participate in Internet list servers. The user is observed at the public terminal receiving and sending messages that others likely would find inappropriate for children. What actions are appropriate?*

*This is similar to situations where children see adults publicly reading books or magazines inappropriate for children, where children see magazine covers or headlines not for children, or where children overhear parts of adult conversations that are not intended for children. These things happen. Children may pass by adults at computer terminals and see words, phrases, or pictures that are inappropriate. Children generally are taught not to stare. They are unlikely to hang over the shoulder of a computer user and read entire messages. If some users are especially agitated about this, the library or community center could establish "adult-only" computer rooms or areas and ask adults who are receiving or sending possibly inappropriate materials to use those rooms.*

*If a user were flagrantly and continuously making a nuisance by receiving and reading inappropriate material from the Internet, the library or community center might, with proper notice, monitor e-mail records or file contents. If there were inappropriate conduct, the library might also inform law enforcement authorities. This would be especially true if there were complaints that an adult user of online services was using the library as a place to solicit children.*

## 6. Internet Access for Children

*A library or community center wants to provide Internet access to children but is concerned that some newsgroups and some areas of the World Wide Web contain unsuitable material. What is the best way to proceed?*

*A library or community center providing Internet access for children may use available hardware and software to restrict Internet access. It is possible to construct a firewall between a local system and the Internet. Any communications between the two would have to go through the firewall, which could be programmed to restrict Internet access for certain users (i.e., children). Users first would have to log in through the firewall system to access the Internet.*

*A variation is to provide a software program and menu for an online system that makes it easy for users to access certain parts of the internet. Standard menu choices might include certain databases, government documents, book and hobbyist discussion groups,* *etc. Although technically not restricting access to other parts of the Internet, a user would need some computer/communications sophistication and knowledge of the Internet to access other areas.*

*No technical solution is foolproof. Once users are on the Internet, with patience, interest, and some knowledge, they can figure out how to navigate around. The library or community center could inform users what restrictions apply. With notice, random monitoring might be used to ensure that the system is being used properly. If particular children seem to be engaging in unwelcome activities, the system operator could warn them about the capability to monitor Internet accounts and online activities. As in any other area of library or community center activity, the system operator needs to be cautious that there is cause to single out a particular person or group and should not base suspicions on stereotypes. Existing constitutional and statutory limitations on access to information should not be diminished or weakened on the Information Superhighway.*

## 7. Anonymous Usergroups, FTP Sites, and Remailers

*At a community center, users want to establish anonymous usergroups, FTP (file transfer protocol) sites, and remailers. Some of this activity will support discussions of sensitive and controversial subjects. What is an appropriate response?*

*The importance of anonymity, and use of pseudonyms, in communications and speech is well established as part of American political and social culture. Spheres for anonymous communication should be permitted on the Information Superhighway, subject to public policies intended to secure and maintain the integrity and enforceability of rights and protections under U.S. laws. A community center could offer anonymous services and become responsible for addressing the demands and values of both anonymity and accountability. A provider of anonymous services needs to be sensitive to concerns about misuse of intellectual property, defamation, child pornography, harassment, and mail fraud.*

*In creating an anonymous discussion group, the moderator can require that identities of individuals be provided. This is necessary for administrative purposes, and for excluding minors from adult-only discussion groups. The anonymity of users is not complete, and users should be informed of that. Sophisticated users may know how to request anonymity under a fictitious persona. The real identity of these users will not be known. For some sensitive or controversial anonymous discussion groups, a moderator may want to require additional identification before allowing a user to join.*

*Because of the responsibility for balancing anonymity and accountability, a moderator may choose to engage in some supervision of content. In determining the extent of supervision, a moderator should be aware that recent court decisions suggest that more active review of system activities—for example, screening messages before distribution—may bring with it a higher level of legal responsibility for the content of communications. The moderator may be legally held responsible as an editor rather than a passive distributor of material.*

*Subscribers to a discussion forum should be advised in advance of the extent and nature of any monitoring, especially any intrusive monitoring. If there is any indication that* *communications may lead to illegal activities (solicitation of sexual favors or gambling or exchanges of copyrighted materials), the moderator will need to take action for self-protection as well as to preserve the integrity of the discussion group. Those who engage in illegal activities or inappropriate discussions can be locked out of the group and/or reported to appropriate authorities.*

*An anonymous FTP site allows users to share computer files, programs, images, and other material. There is a possibility that copyrighted or other inappropriate material may be made available by some participants. Because these files are publicly available, reviewing them does not violate any privacy interests and may be the only way to prevent improper use of the facility. It is appropriate to establish standards for acceptable materials, to warn users not to upload copyrighted or other unwanted items, and to delete any file that violates the rules.*

*An anonymous remailer allows messages to be transmitted to a recipient without any identification of the sender. Some remailers allow recipients to respond to the anonymous senders. Others are completely anonymous, with no record of the identity of the sender. Remailers can be used for harassment and in other unwelcome ways. Systems operators offering remailers should clearly describe the nature of any supervision so that senders are aware of the rules. Operators should also be sensitive to the possibility of misuse of the remailing facility. Those who violate rules can be locked out of the system.*

## 8. Encryption of Online Communications

*At a library, a group wants to encrypt e-mail communications. Should encryption be allowed?*

*If users encrypt communications, the library (as system operator) will not be able to decipher the content. This lessens the system operator's ability to monitor the system and to exercise supervisory responsibilities. If users want to encrypt for a lawful purpose they people should be able to do so. Communications in an online environment are not secure from trespass and tampering, and encryption offers a remedy. In any event, users do not really need permission to encrypt. Messages can be encrypted if the sender and user agree.*

*The library may want to formulate general guidelines specifying the circumstances under which it will allow encryption, and it may want to review the guidelines occasionally. This would serve two purposes. First, it protects the library against charges by other users that permission to encrypt was given in an arbitrary manner. Second, the library retains some responsibility for the activities of users and for the maintenance of the online system.*

## 9. Sale of Lists of Online Discussion Groups

*A community center establishes an online discussion group for sports fans. A sports magazine approaches the community center and offers to pay for the list of names and addresses of members of this group. Should the community center sell the list?*

*The members of the sports group revealed personally identifiable information to the community center for purposes of engaging in an online discussion for sports fans. The individual should be informed in advance of other uses and disclosures of that information. Although the disclosure of information is related to a general category of "sports," involvement in a discussion group does not indicate that an individual is interested in other sports products or services.*

*If a community center wants to sell the list, then it should inform users and potential users (both in paper and electronic form) that its policy is to sell lists of discussion groups. At a minimum, individuals should have a choice of excluding themselves from any mailing list that is sold (opt-out). The choice should be offered when an individual first joins the group. An individual should have the opportunity to make a different choice later.*

## 10. Tampering with Official Online Records

*A student surreptitiously accesses school records and changes the "D" grades of selected students to "B" grades. Once the tampering has been discovered, how can school authorities determine who did it, and how can they prevent this from occurring in the future?*

*Given the sensitivity of the information contained in school records, school authorities may want to exclude them from online access. This would mean that teachers would not be able to enter grades or comments onto records directly, but records would be more secure from remote tampering.*

*If records are accessible online, the school may take preventive steps to ensure that records are not accessed inappropriately or changed. Data integrity—including accuracy, relevance, and timeliness of personally identifiable information—must be paramount on the Information Superhighway. A school that does not provide adequate security for its online systems may be liable for its negligence. Online records may call for certification or authentication to guard against deliberate or inadvertent changes.*

*The school should inform users that tampering with official school records is illegal and describe the consequences. Computer systems can create audit trails that track user activities and determine who accessed records and changed the grades. This may assist in determining who logged on, when, and for how long. It is possible, however, that a hacker used another student's account as a front. School authorities therefore should be thorough in their investigations before accusing a particular individual. Since the activity described here is illegal, the school may inform law enforcement authorities and seek assistance.*

*To lessen the prospect of inappropriate access, the school could consider encrypting student records and establishing a two-step procedure to access official records. Also, to help maintain the accuracy and completeness of student records and in keeping with the Family Educational Rights and Privacy Act, the school should give students the opportunity to see their records and to correct mistakes.*

*Should the school inspect the records of all students to see who logged on to the computer at the time the e-mail message was sent? This is a judgment call that the school will have to make by balancing the interest in finding and punishing a troublemaker against the privacy interest of users and the established rules for the system. If this is the first such incident, school authorities may choose to issue a severely worded warning and indicate that if this happens again the records of all students will be searched and the e-mail system will be shut down until the culprit is found.*

*Regardless of what the school does in response to this specific incident, once the system's security is compromised, the school should consider upgrading security. Passwords and access codes should be changed. Additionally, the school should consider a system of multilevel passwords to enable users to access e-mail or to send e-mail to all users.*

## 11. Online Access by Other Government Agencies

*In order to better coordinate activities and to identify public health problems, a county school system wants its student health records to be available online to the county health department. What should the school system do to ensure the privacy and security of the records?*

*The sensitive information that may appear in student health records needs to be evaluated carefully before online access is established. Needs must be balanced against risks. As part of the balancing, a school may create different security fields within records and allow the county access only to part of the records.*

*The school should give notice to parents and students that the records will be available online to the county. Parents may be given explicit information on the likely uses and disclosures of medical records (for example, to a county welfare department or to law enforcement authorities). Parents should have an opportunity to give their informed consent. Because of the sensitive nature of health information, it may be appropriate for parents to consent affirmatively to any subsequent uses or disclosures (opt-in rather than opt-out).*

*Additionally, it would be appropriate for health records to be encrypted for online transmission in order to ensure that unauthorized persons cannot obtain access or tamper with the information.*

*The concerns raised in this scenario (informed consent, opt-in, security levels, and encryption) would occur as a result of any request from a State or county agency to go online with a school.*

## 12. Expectation of Privacy Scenario

*During a parenting discussion group that takes place on a community center's online system, one parent alleges that another parent revealed information about him and his family that was privately communicated and not for public consumption. What should the community center do?*

*One of the "growing pains" that groups and individuals encounter when they join electronic, virtual, communities is determining the appropriate tone and manner of acceptable online communication. This is similar to what occurs in the world of face-to-face communities. Individuals in groups need time to acclimate themselves to the group's norms and find a style with which they and the group are comfortable. Rational discussions of differences and disagreements are one way that these norms are developed and consensus is achieved. Several days of discussion among members of the group will help all to learn from the incident, and some new norms of civility will emerge in the group. The center may want to encourage the group to set its own rules.*

# section4

## RESOURCES FOR COMMUNITIES

# part1

## Resources in Print

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## MUSEUMS AND ARCHIVES

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## INFORMATION RESOURCES FOR PRIVACY, SECURITY, AND INTELLECTUAL PROPERTY

There are organizations in the fields of education, technology, and law concerned about privacy, security, and intellectual property in the online world. Many of these publish pamphlets, fact sheets, and reports. Some have discussion groups or listserves with relevant information. Several groups are listed below. This list is not meant to be exhaustive, but to provide a way for schools, libraries, and community centers to be involved in the information exchanges and discussions on these topics.

American Federation of Musicians, 1501 Broadway, Suite 600, New York, NY 10036, Tel: 212-869-1330.

American Federation of Teachers, 555 New Jersey Avenue, NW, Washington, DC 20001, Tel: 202-393-7477.

American Federation of Television & Radio Artists, 260 Madison Avenue, New York, NY 10016, Tel: 212-532-0800.

American Library Association, 50 E. Huron Street, Chicago, IL 60611-2795, Tel: 312-944-6780.

American Publishers Association, 71 Fifth Avenue, New York, NY 10006, Tel: 212-255-0200.

American Society of Composers, Authors & Publishers (ASCAP), ASCAP Building. One Lincoln Plaza, New York, NY 10023, Tel: 212-621-6000.

Authors Guild, 330 West 42nd Street, 29th Floor, New York, NY 10036, Tel: 212-563-5904.

Benton Foundation, Communications Program, 1634 Eye Street, NW, Washington, DC 20006, Tel: 202-638-5770.

Broadcast Music, Inc., 320 West 57th Street, New York, NY 10019, Tel: 212-586-2000.

Business Software Alliance, 2001 L Street, NW, Suite 400, Washington, DC 20036, Tel: 202-872-5500.

Center for Democracy and Technology, 1001 G Street, NW, Suite 700 East, Washington, DC 20001, Tel: 202-637-9800, E-mail: info@cdt.org.

Center for Media Education, 1511 K Street, NW, Suite 518, Washington, DC 20008, Tel: 202-628-2620.

Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: 508-750-8400.

EduPage, Educom, 1112 16th Street, NW, Washington, DC 20036, Tel: 202-4200, E-mail: infro@educom.edu.

Electronic Frontier Foundation, 1550 Bryant, San Francisco, CA 94117, Tel: 415-436-9333; Fax: 415-436-9993, E-mail: eff@eff.org.

Electronic Privacy Information Center, 666 Pennsylvania Avenue SE, Suite 301, Washington, DC 20003, Tel: 202-547-5482, E-mail: info@epic.org.

Information Industry Association, 555 New Jersey Ave., NW, Suite 800, Washington, DC 20001, Tel: 202-639-8262.

Motion Picture Association of America, 1600 Eye Street, NW, Washington, DC 20006, Tel: 202-293-1966.

National Education Association. Center for Education Technology, 1201 16th Street, NW, Washington, DC 20036.

National Association of Broadcasters, 1771 N Street, NW, Washington, DC 20036, Tel: 202-429-5300.

National Music Publishers Association, 711 Third Avenue, 8th Floor, New York, NY 10017, Tel: 212-370-5330.

National School Boards Association, Institute for the Transfer of Technology to Education, 1680 Duke Street, Alexandria, VA 22314, Tel: 703-838-6722.

National Coordinating Committee on Technology in Education and Training, P.O. Box 4437, Alexandria, VA 22303, Tel: 703-351-5243.

Recording Industry Association of America, Inc., 1020 19th Street, NW, Suite 200, Washington, DC 20036, Tel: 202-775-0101.

SESAC, Inc., 55 Music Square East, Nashville, TN 37203, Tel: 800-826-9996.

Software Publishers Association, 1730 M Street, NW, Suite 700, Washington, DC 20036, Tel: 202-452-1600.

The Center for Children and Technology, 96 Morton Street, New York, NY 90064, Tel: 310-470-6590.WGA, Writers Guild of America Association (WGAE), 555 West 57th Street, New York, NY 10019, Tel: 212-767-7800.

The Children's Partnership, 1460 4th Street, Suite 306, Santa Monica, CA 90401, Tel: 310-260-1921, E-mail: HN3824@handsnet.org

The Computer Learning Foundation, Inc., 2431 Park Blvd., Palo Alto, CA 94306, Tel: 415-327-3347.

U.S. Copyright Office, Public Information Office, Library of Congress, Washington, DC 20559-6303, General Information (Tel): 202-707-3000; Hotline (to order forms and circulars): 202-707-9100.

WIPO, The International Bureau of the World Intellectual Property Organization, 34, chemin des Colombettes, 1211 Geneve 20, SUISSE.

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# part 2
# Resources Online

## EDUCATION

### Apple Computer Inc. (http://www.info.apple.com/education/)

This site is full of information on Apple's extensive education program. Also check out the Apple Classroom of Tomorrow (http://www.info.apple.com/education/acot.menu.html) Web site, which includes brief summaries of the reports conducted by the ACOT research unit.

### Arkansas Science Teachers Association (http://hermes.k12.ar.us/asta)

The Arkansas Science Teachers Association, represented by more than 900 schools in Arkansas, offers teachers support for curriculum development via the public school network using WWW pages and discussion listservs among science teachers around the State.

### Autodesk Foundation (http://www.autodesk.com/aboutad/foundati/foundati.htm)

This site contains general information about the foundation, as well as specifics about its Mendicino school system project and other partnerships with local school districts.

### Bell South Corp. (http://www/bstbls.com/bbs/press-releases.html)

This web site offers press releases on Bell South educational technology programs.

### Bolt Bernaek and Newman Inc., National School Network Testbed (http://copernicus.bbn.com/testbed2/)

BBN, a leader in the field of educational technology, describes in detail a comprehensive demonstration project in school networking.

### Classroom Connect on the Net (http://wentworth.com/classroom/default.html)

This handsome and comprehensive Web site maintained by Wentworth Worldwide Media provides lesson plans, libraries, museums, science projects, and numerous other valuable resources that can be used in the classroom today. Wentworth has embarked on an ambitious multimedia publishing program for the K-12 market, including newsletters, books, videotapes, computer software, and seminars. Webworld site is full of links to important business sites and contains an impressive list of nonprofit organizations' Web sites.

### Center for Networked Information Discovery and Retrieval (CNIDR) (http://www.cnidr.org)

Created by the National Science Foundation to support networked information discovery and retrieval, CNIDR hosts a number of WWW servers for information. John and Janice's Research Page, which can be reached through Janice's K-12 Outpost, shows results of an ongoing survey of schools with Internet connections.

**Center for Research on Evaluation, Standards, and Student Testing (http://www.cse.ucla.edu/)**

CRESST, based at the University of California at Los Angeles, offers a rich array of reports on research into alternative forms of evaluating student learning. Although not geared exclusively to the role of technology in the classroom, these papers give a detailed view of the theory and practice of "performance-based assessment," which many analysts believe must become one of the objectives of school reform.

**Cityschools (http://www.ncrel.org/ncrel/sdrs/pathways.htm.)**

Cityschools is a magazine that "brings research to life in actual settings by telling the stories of real educators who are finding solutions to enduring educational problems. Each issue focuses on one topic and features the work of researchers and successful practices, as well as sources of additional information. It is produced by the North Central Regional Educational Library.

**Computer as a Learning Partner (http://www.clp.berkeley.edu/CLP.html#top)**

In this educational research project at the University of California at Berkeley, educational researchers, natural scientists, middle school teachers, and technology experts describe a semester-long thermodynamics, light, and sound curriculum for achieving integrated science understanding that involves the innovative use of computers in the classroom. This Web site also has a lengthy list of other education-oriented Web sites.

**Consortium for School Networking (http://cosn.org)**

Although still under construction, this Web site promises to offer updates on important policy discussions involving school networking.

**Delmar Elementary School (http://www.intercom.net/local/weeg)**

Teacher Patricia Weeg maintains this homepage describing her students' many uses of the Internet—especially the KIDLINK keypal program. The Resources for Teachers section is full of links to other interesting Web sites.

**Diplomats Online (AFSATEX@AOL.COM)**

Diplomats Online (DOL) is an activity of the American Foreign Service Association intended to promote and sustain an ongoing dialogue on the role of the United States in the post-Cold War world. Discussions are guided by active and retired American diplomats. One of the goals of the service is to help schools see the potential for online networks as tools that can link global events to the curriculum. DOL is hosting a National History Day forum during the 1995-1996 academic year in which diplomats will serve as guides for students developing research projects on the 1995 theme "Conflict and Compromise."

**Education Technology Resources (http://www.camosun.bc.ca)**

For a view from Canada, look up this site of the Standing Committee on Education Technology (SCOET), a panel of volunteers representing the 20 publicly funded colleges and institutes in British Columbia, Canada. Educational Resources has a variety of interesting links.

**Educom Home Page (http://www.educom.edu/).**

Although oriented primarily toward higher education, this easy-to-maneuver Web site provides a wealth of information on educational technology issues from one of the early players in the field.

**EDWeb (http://K12.cnidr.org:90)**

The Corporation for Public Broadcasting's education site includes very useful and accessible explanations of the development of the Internet and its relationship to education reform by author Andy Carvin.

**Fairland Elementary (http://www.wam.umd.edu/~toh/fairland.html)**

This homepage, maintained by teacher Mary O'Haver, displays student work and includes an annotated set of links to other education sites of particular interest to teachers—including Monarch Watch.

**From Now On: The Educational Technology Journal (http://www.pacificrim.net)**

Maintained by Jamieson McKenzie, a teacher, school administrator, and technology expert in Bellingham, WA, this online publication is full of fascinating musings on the nature of Internet-based learning. The site also offers advice to school officials on how to plan technology acquisition and use.

**Global SchoolNet Foundation (http://www.gsn.org)**

A nonprofit corporation launched by a group of San Diego teachers more than 10 years ago, GSN conducts and offers assistance to teachers in designing collaborative learning projects; helps schools and other institutions develop telecomputing plans; publishes articles, disseminates model lesson plans, training materials, and instructional videos; provides newsgroups and discussion lists for classroom use; offers workshops and training; and coordinates conferences using desktop computers.

**Hewlett Packard Mentor Program (http://mentor.external.hp.com)**

This computer company offers to connect its employees to students in an e-mail mentoring program.

**ILTWeb (http://www.ilt.columbia.edu)**

The Institute of Learning Technologies, part of Columbia University, maintains this site full of readings, electronic texts, journals, and hypertext documents on the role of networked digital communication and multimedia in education. The materials are comprehensive and fascinating, but they can be difficult for the casual reader.

**Institute for Learning Sciences (http://www.ils.nwu.edu)**

Northwestern University's ILS—an interdisciplinary research and development center dedicated to transferring innovative educational technology from the laboratory to practical applications in businesses, schools, government agencies, and the community—builds educational software for use in multimedia computers. The site includes Engines, a "hyper-book" by Roger Shank, ILS director, and Chip Cleary, a graduate student, on the problems with the education system and how to reform it—especially through the use of educational technology.

**International Education and Resource Network (I*EARN) (http://www.iearn.org/iearn/)**

This Web site sponsors a variety of learning projects, mostly on environmental topics and offers conferences for teachers and education managers.

**KIDLINK (http://www.kidlink.org)**

This grassroots kidpal project has drawn 37,000 children from 71 countries into a "global dialogue." For a glowing recommendation, see the Delmar Elementary School homepage cited above.

**LabNet (http://hub.terc.edu/terc/LabNet/LabNet.html)**

A forum for K-12 science and math teachers to explore inquiry-oriented, project-based learning. The site offers teachers access to Presidential Awardees, Woodrow Wilson Fellows and other recognized teachers, discussion groups, online collaborative projects, news, and more.

**George Lucas Educational Foundation (http://glef.org/)**

Visitors to this site can read the foundation's mission statement, as well as brief descriptions of its newsletter and projects.

**Mendocino Community Network (http://www.mcn.org)**

The education pages offer an excellent and comprehensive set of lesson plans on how the Internet can be used in teaching a wide range of subjects. Other pages show how the school's networking activities have become a focal point for economic and community development.

**Microsoft Corp. (http://www.microsoft.com/Services)**

This site describes the software company's various products and activities involving primary and secondary education. The discussion on school curriculum is interesting, although it focuses primarily on Microsoft's own products rather than dealing with the topic generally.

**NASA IITA K-12 Internet Initiative (http://quest.arc.nasa.gov/gov/nk12/home.html)**

This site describes NASA's many educational activities, including online interactive projects, grants programs, assistance in learning to use the Internet in schools, and links to NASA's own online resources.

**National Academy of Sciences (http://www.nas.edu/nap/online/techgap)**

A clear and well-produced discussion on how computer networking can and must lead to school reform.

**National Education Association (http://www.nea.org)**

The National Education Association's addition to the World Wide Web is an invitation to cyberspace travelers interested in public schools. The Association hopes that for both the public and its 2.2 million members, its site serves as a valuable destination for those interested in sharing, learning, and synthesizing ideas about rebuilding the public confidence in public education.

**Net Squared Education (http://www.commerce.com/net2/library/education.html)**

Global Commerce Link, a communications company that provides and manages online services for businesses, offers a variety of links to schools and education resources. The links are not thematically organized, thus finding what you want can be time consuming, tedious, and chancy.

**North Central Regional Educational Laboratory (http://www.ncrel.org/ncrel/)**

NCREL, one of 10 regional education laboratories financed by the U.S. Department of Education, offers a useful essay discussing how changes in the nature of the economy require a different approach to schooling.

**Pacific Bell Corp. (http://www.pacbell.com/SuperHi/index.html)**

This Web site offers information about the company's technology program for schools.

**Passport to Knowledge (http://quest.arc.nasa.gov/livefrom/passport.html)**

Similar to the work of the Jason Foundation, this multimedia project takes children on two or three field trips to exotic places via live, interactive video, bolstered by taped segments. In addition, students can tap into an online encyclopedia that answers simple questions automatically and forwards more difficult ones to a group of online experts. Teachers also receive a printed guide suggesting adaptions for math, social studies, language arts, and computer classes.

**Syllabus Web (http://www.syllabus.com)**

Published by Syllabus Press, this site offers an eclectic collection of information on technologies used to enhance education.

**Technical Education Research Centers (TERC) (http://hub.terc.edu)**

TERC is a nonprofit organization that researches and promotes innovative approaches to math, science, and technology education. Its Web site describes a variety of projects involving students in collaborative online science investigations. It operates The Hub, an Internet publication service that disseminates reports, curricula, projects in progress, calendars, articles, and software of value to educators.

**The Collaboratory Visualization Project (CoVis) (http://www.covis.nwu.edu)**

Comprises thousands of students, more than 100 teachers, and dozens of researchers all working together to find new ways to think about and practice science in the classroom.

**The Educational Resources Information Center (http://www.cua.edu/www/eric_ae/home.html)**

ERIC, a national information system established in 1966 and supported by the U.S. Department of Education, contains more than 850,000 abstracts of documents and journal articles on education research and practice. As the sheer volume of the material suggests, this is a Web site for the serious researcher, not the casual reader.

**The Geometry Forum (http://forum.swarthmore.edu/)**

Funded by the National Science Foundation, this project, based at Swarthmore College near Philadelphia, is an electronic community dedicated to the teaching of geometry. Its most active components are discussion groups in which teachers can exchange ideas with each other and with professional mathematicians.

**The Globe Program (http://www.globe.gov)**

Launched by Vice President Gore, this project seeks to enlist students in measuring environmental phenomena worldwide and then to link them to scientists for data analysis and interpretation.

**The Internet and Schools (http://sunsite.unc.edu/cisco/tracy-article.html)**

A comprehensive report on major groups and activities shaping the Internet's role in education. This is part of the Sun Microsystems Inc. Cisco Education Archive (http://sun.site.unc.edu/cisco/cisco-home.html).

**The Jason Project (http://seawifs.gsfc.nasa.gov/JASON.html)**

The Jason Foundation for Education, formed by explorer Robert Ballard, organizes annual interactive field trips to a volcano in Hawaii, the Galapagos Islands, the Mayan ruins, and other locales. The foundation's substantial curriculum suggests and lesson plans stress hands-on activities and multidisciplinary approaches. Each year's project culminates in 60 hours of interactive television coverage. An online component of the program enables students to exchange notes with explorers at the scene—including students and teachers selected to represent various regions—and to help student, participate in actual research with scientists.

**The Online Internet Institute (OII) (http://prism.prs.K12.NJ.US:70/0/OIIsignup.html)**

This cooperative project brought together 400 teachers and an impressive array of mentors during summer 1995 to conduct workshops exploring ways to make use of the Internet in classrooms. One of the Institute's guiding lights in Ferdi Serim, a Princeton, NJ, teacher and former drummer for Dizzy Gillespie. He reports of the Institute's activities in the "Roving Reporter" section of Houghton Mifflin's GNN Education Center (http://www.gnn.com/gnn/meta/edu/index.html), which offers teachers a variety of curricula ideas as well as connections to education experts and other teachers.

**The Smithsonian Ocean Planet Exhibit (http://seawifs.gsfc.nasa.gov/ocean planet.html)**

Want to take an online excursion to a current exhibit at the Smithsonian in Washington, DC? This handsome, well-organized site offers cybervisitors more information than the actual exhibit does.

**West Virginia World School (http://world.school@bell-atl.com/)**

This site is hosted by Bell Atlantic for the hundreds of Mountain State teachers, students, principals, and others using computers, networks, and the resources of the Internet in their classrooms.

**Web66: A K12 World Wide Web (http://Web66.coled.umn.edu)**

A project of the University of Minnesota College of Education and the Center for Applied Research and Educational Improvement, this site is designed to help educators establish their own Internet servers, form links with teachers and students at other schools, and find useful resources on the World Wide Web.

## LIBRARIES

The following Web sites provide views about either digital libraries and/or the Information Superhighway:

- Building the Interspace: The Illinois Digital Library Project (http://surya.grainger.uiuc.edu/dli/)
- Columbia University's Project Bartleby (http://www.cc.columbia.edu/acis/bartleby/index.html)
- Dewey Web Library (http://www.umich.edu/~jmillr/WWW-libraries.html#100)
- Digital Information Infrastructure Guide (gopher://farnsworth.mit.edu/)
- Digital Libraries '95 On-Line Proceedings. The Second Annual Conference on the Theory and Practice of Digital Libraries. June 11-13, 1995, Austin, Texas (http://csdl.tamu.edu/DL95/)
- D-Lib: the Magazine of the Digital Library Forum (http://www.dlib.org)
- Informedia Digital Video Library (http://fuzine.mt.cs.cmu.edu/im/informedia.html)
- Information Infrastructure Standards Panel (IISP) (www.ansi.org/iisp/iisphome.html)
- Interoperability, Scaling, and the Digital Libraries Research Agenda: A Report on the May 18-19, 1995 IITA Digital Libraries Workshop. (http://www-diglib.standford.edu/diglib/pub/reports/iita-dlw/main.html)
- Internet Advocate: A Web-Based Resource Guide for Librarians and Educators Interested in Providing Youth Access to the Net (http://silver.ucs.indiana.edu/~lchampel/netadv.htm)
- Libraries for the Future (http://www.inch.com/~lff/lffhome.htm)
- Project MUSE (Johns Hopkins University) (http://muse.jhu.edu/)
- The Alexandria Digital Library (http://alexandria.sdc.ucsb.edu/)
- The Electronic Text Center at the University of Virginia (http://www.lib.virginia.edu/etext/ETC.html)
- The Stanford Digital Library Project (http://Mjosa.Stanford.EDU:80/diglib/)
- The UC Berkley's Digital Library Project (http://elib.cs.berkeley.edu/)
- University of Michigan Digital Library Project (http://www.sils.umich.edu/UMDL/HomePage.html)

- [XIWT - ] Cross-Industry Working Team: An Architectural Framework for the National Information Infrastructure (http:/www.cnri.reston.va.us:3000/XIWT/ documents/arch_doc/title_page.html)

### Arkansas Special Collections (http://www.uark.edu/libinfo/speccoll/)

Extensive catalogues of information about specialized Arkansas resources, such as selected papers and photographs of Senator William Fulbright (the Fulbright Exchange Program Papers), Orville Faubus, William Grant Still, Daisy Bates, and other historical Arkansas figures are made available online through the University of Arkansas WWW.

## MUSEUMS AND ARCHIVES

- Archives & Archivists (http://miavx1.muohio.edu/~harlanjb/personal/projects/archives/)
- Impact Guide to Museums on the Web (http://www.sils.umich.edu/impact/Museums/)
- Museums on the Web (http://curry.edschool.virginia.edu/~lha5w/museum)
- Museums Online Resource Review (http://www.okc.com/morr/)
- Natural History Museum of Los Angeles County Guide to Museums and Cultural Resources on the Web (http://www.usc.edu/lacmnh/webmuseums)
- Smithsonian Institution (http://www.si.edu)
- World Wide Arts Resources (http://www.concourse.com/wwar/default.html)
- WWW Virtual Library: Museums (http://www.comlab.ox.ac.uk/archive/other/museums.html)
- Yahoo - Arts: Museums (http://www.yahoo.com/Arts/Museums)
- Yahoo - Science: Museums and Exhibits (http://www.yahoo.com/Science/Museums_and_Exhibits)
- Yahoo - Society and Culture: Museums and Exhibits (http://www.yahoo.com/Society_and_Culture/Museums_and_Exhibits)

### National Center for Resource Innovations (http://www.cast.uark.edu)

National Archeological Databases and extensive catalogues of Arkansas and National Geographic Information Systems (GIS) data are available to all institutions and to county and local governments through the National Center for Resource Innovations. The Center compiles new data through remote sensing and digital photogrammetry, makes it available through a WWW interface, and offers county and local governments opportunities for technology transfer.

## OTHER SITES

### ACCESS.TXT (http://www.webable.com)

ACCESS.TXT is an ongoing list of known Internet and online newsgroups that address the interests and needs of people with disabilities. The purpose of this list is strictly informational. It has been developed by Mike Paciello, of DEC, with help from Dave Jaffe of the Virginia Department of Rehabilitation and Mark Gibbs and Richard Smith's *Navigating the Internet*.

### American Communication Association Center for Communication Law (http://www.uark.edu/depts/comminfo/www/ACA.html)

The American Communication Association Center for Communication Law includes Internet resources focused on freedom of speech, freedom of information, freedom of religion, and telecommunications law and policy in the areas of privacy, security, and intellectual property management in the digital environment.

### Benton Foundation (http://cdinet.com/benton)

The Benton Foundation's Communications Policy Project promotes public interest values and noncommercial services for the National Information Infrastructure through research, policy analysis, print, video, and online publishing and outreach to nonprofits and foundations. The Web site includes updates on communications policy and upcoming events; a forum for discussion; publications such as bulletins, policy briefings, and working papers; and cyber pages of other online resources.

### Interesting Places for Kids (http://www.crc.ricoh.com/people/steve/kids.html)

Steve Sasvitzky, senior computer scientist at Ricoh California Research Center, maintains this eclectic Web page with links to child-oriented literature, museums, entertainment, and other sites.

### Internetworking: Planning and Implementing A Wide-Area Network (WAN) (http://www.stl.nps.navy.mil/~rjbigelo/thesis/toc.html)

Produced by Lieutenant Randall J. Bigelow (Naval Postgraduate School) as a Master of Science thesis in information technology management, this paper documents the planning, design, and implementation of a regional wide area network connecting K-12 schools, research institutions, libraries, and institutions of higher education throughout the Monterey Bay area of California's central coast. The processes used to develop the network and resolve myriad issues are of direct relevance to the K-12 community as well as network planners, administrators, and funding partners.

### Project Aladdin (http://www.uark.edu/community/comnet.html)

Project Aladdin, the Northwest Arkansas Community Information Network, provides access to city and county government information, chambers of commerce, local arts center activities, public library, regional planning commission activities, community events, and more through public kiosks positioned at the Bank of Fayetteville on the downtown square in Fayetteville. The University of Arkansas provides training and server space for community members to develop their WWW pages.

**Yahoo (http://www.yahoo.com/Education/On_line_Teaching_and_Learning)**

This site lists a large number of education-related sites. It gives a general sense of what is available, but it is so sweeping that much probably will not be relevant to your particular interests.

## GOVERNMENT SITES

### Information Infrastructure Task Force (http://iitfeat.nist.gov:94/doc/Education.html)

The Clinton Administration's interagency IITF has produced a series of papers exploring various aspects of the Information Superhighway. "A Transformation of Learning: Use of the NII for Education and Lifelong Learning" lays out arguments for how networking can change schools. The paper includes a useful bibliography.

### Office of Education Research and Improvement (OERI) Bulletin (http://www.ed.gov/newsletters.html)

The Office of Education Research and Improvement (OERI) is the main research and statistics arm of the U.S. Department of Education. Last year it supported 20 national research and development centers, 10 regional education laboratoires, 16 plus information clearinghouses (ERIC), Star Schools, the National Diffusion Network, Blue Ribbon Schools, Eisenhower math/science consortia, and more. It houses, among other things, the National Center for Education Statistics, the National Library of Education, and the Department's Online Library.

### The National Science Foundation Directorate for Education and Human Resources (http://red.www.nsf.gov)

The NSF is behind some of the most innovative projects to develop computer networking in education. To find a description of the Common Knowledge Project in Pittsburgh and the Learning Through Collaborative Visualization (CoVis) Project, first click on EHR programs page, click on Networking Infrastructure for Education for a variety of interesting NSF-backed projects. Also of interest is the division of elementary, secondary, and information education, which describes NSF'S Global Schoolhouse project, and has an archive of brief and interesting news about uses of technology in education.

### The National Telecommunications and Information Administration WWW Server (http://www.ntia.doc.gov)

The NTIA maintains information on its programs that provide grants and assistance for information infrastructure development at this site.

### Office of Technology Assessment (http://www.ota.gov)

The OTA has been a leader in promoting creative uses of technology in schools. The future of this Web site is uncertain because Congress is eliminating the agency, so check soon. It includes text of the seminal study, *Teachers & Technology: Making the Connection.*

**The U.S. Department of Education Homepage (http://www.ed.gov/index.html)**

This Web site contains a variety of interesting resources on education, laying out national educational policy and describing the department's activities. The technology initiative site describes the challenge grants program and lists examples of how schools are using networking.

**The U.S. National Information Infrastructure Virtual Library (http://nii.nist.gov/edu.html)**

The U.S. National Information Infrastructure Virtual Library provides a place where people can find out what an advanced information infrastructure really means and how they can use it in areas such as education, libraries, government services, health care, electronic commerce, and manufacturing.

# part 3

# Examples of Acceptable Use Policies

Establishing clear and simple "Rules of the Road" is essential in making the Information Superhighway safe and enjoyable for everyone. The following Acceptable Use Policies are examples of how schools, libraries, and community centers can create guidelines for users of the Information Superhighway. Although the policies on the following pages provide a good idea of the scope of the rules of the road, guidelines can and should be different for each institution or community. After all, there will be as many different opportunities and challenges confronting schools, libraries, and community centers as there are different institutions. While not endorsing the following policies specifically, the Council applauds the initiative shown by these institutions and urges that all others participating in the Information Superhighway formulate policies that best fit their own circumstances.

## Norwood Network Acceptable Use Policy

As a member of the Norwood School community, a community based on intellectual growth and moral responsibility, you are invited to participate in using the Norwood Network. The Norwood Net is a computer network being developed to connect people and information in support of Norwood School's educational mission. Access to Norwood Net resources is a privilege offered to all Norwood School faculty and staff, enrolled students, their parents, and other members of our school community as determined by the administration, technology specialist and educational technology committee(s). The Network is to be used for *educational purposes*, defined as purposes directly related to a Norwood School assignment, project, project job, or function for which the user is responsible.

Every Norwood Net user is expected to act in a responsible, ethical and legal manner, in accordance with the Norwood Net Acceptable Use Policy (including the User Responsibilities described on the reverse of this page), the guidelines of the other networks they use, and other applicable state and federal regulations. Norwood School enforces this Policy at all times. Ultimately, however, parent(s) and guardian(s) of minors are responsible for setting and conveying the standard that their child(ren) should follow. Your child has been taught acceptable computer use in school and he/she helped develop the Norwood School Computer Rules which every Norwood student is required to sign and follow.

Before a Norwood Net account can be offered to your family, we ask that you review the Policy with all those who will be authorized to use the account (Norwood School students and their parents). Please sign the consent form to indicate your support of this policy and your agreement to adhere to it as privileges are made available to you. Norwood School supports and respects each family's right to decide whether or not to accept Norwood Net access.

Norwood Network privileges will be made available only to those agreeing to the User Responsibilities described herein. Once agreed to, violation of the Acceptable Use Policy may result in restricted network access or loss of network privileges, at the discretion of the educational technology specialist and school administration. If necessary, disciplinary and/or legal action will be enforced.

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I have read in full the Norwood Network Acceptable Use Policy (including the User Responsibilities listed on the reverse) and agree to support and uphold the Policy for my personal use and use of my child(ren). I understand that any violation of the Policy may result in loss of my privileges to use the Norwood Net. I also understand that if I knowingly allow others to violate these rules, I may lose my personal access. My signature shows this understanding.

Please sign the appropriate space(s):

Norwood Faculty/Staff: ______________________ ____________

Date

Norwood Parent: ______________________

## Norwood Net User Responsibilities:

**Policy:**

1. I agree to uphold Norwood School community values and represent Norwood School positively as I use the Norwood Network and in other electronic communications.
2. I will respect the privacy of all information on the network and on individual computers. I will not attempt to read, delete or modify files belonging to other users. Nor will I attempt to gain unauthorized or illegal access to resources on the Norwood Net or elsewhere.
3. I will not copy or transfer any copyrighted software on workstations or on the Norwood Network without appropriate permission.
4. I will act responsibly to help ensure safe computing both at home and at school and I will not intentionally introduce a virus on a workstation or on the Norwood Network.
5. I will not write, produce, or generate any computer code or message on the network that might disrupt or adversely affect any network users or resources.
6. I will not use the computer to annoy, hinder or harass other users on the Norwood Network or in electronic communications outside of Norwood School.
7. I agree to use appropriate language on the network and in all communications that I may send over the network. I will not use obscene, abusive, or threatening language nor will ! store or print obscene or pornographic text or images.
8. I understand that I am using the Norwood Net at my own risk. Norwood School assumes no responsibilities for:
    a) the content of any advice or information received by a user from a source outside the Norwood Net, or any costs incurred as a result of seeing or accepting such advice.
    b) any consequences of service interruptions or changes, even if these disruptions arise from circumstances under the control of the Norwood Net or Norwood School.

**While it is impossible to document all appropriate conduct, the following procedures serve as a guide for acceptable network use:**

9. I agree to use all computer and network resources appropriately. I will not authorize any other person to use my account, or network privileges.
10. I will not give out my password or attempt to discover or use someone else's login name or password.
11. I will not tamper with or alter computers or associated equipment, including software. I will report any problems to the educational technology specialist, or appropriate school personnel, as soon as possible. I will not knowingly allow others to abuse the system.
12. I agree to be courteous by quitting applications and logging off on the network appropriately. I also agree not to use finite resources wastefully including access time on the network. I will help keep my disk storage space at an acceptable level by regularly deleting unnecessary files.
13. I understand that Norwood School has the right to monitor student accounts, as necessary, to ensure smooth network operations and acceptable use. The system administrator(s) may set quotas for and monitor disk usage and access time. Furthermore, they reserve the right to remove files if, after appropriate warnings, disk space quotas are not maintained.
14. I will not use my account or the network for financial or commercial gain.
15. I agree to surrender my electronic mail account and network privileges under the following conditions:
    a) graduation or departure from Norwood School either as a student, family or faculty member, unless granted extended access.
    b) as requested by the educational technology specialist and School administration as a result of a violation of the Norwood Net Acceptable Use Policy.

## LOS ANGELES UNIFIED SCHOOL DISTRICT

### Information Technology Division

Acceptable Use Policy for LAUSDnet:

Computers are used to support learning and to enhance instruction. Computer networks allow people to interact with many computers. The Internet, a network of networks, allows people to interact with hundreds of thousands of networks and computers. It is a general policy that all computers used through LAUSDnet are to be used in a responsible, efficient, ethical, and legal manner. Failure to adhere to the policy and the guidelines for use of LAUSDnet include:

- Violating the conditions of California Education Code dealing with students' rights to privacy.
- Using profanity, obscenity, or other language that may be offensive to other users.
- Reposting (forwarding) personal communication without the author's prior consent.
- Copying commercial software in violation of copyright laws.
- Using the network for financial gain, for commercial activity, or for any illegal activity.

The person to whom an account is issued is responsible at all times for its proper use.

- LAUSDnet users should change their password frequently.
- Users must not give a password to another user.

Because access to the Internet provides connections to other computer systems located all over the world, users (and parents of users who are students) must understand that neither the Los Angeles Unified School District or any District staff member controls the content of the information available on these other systems. Some of the information available is controversial and, sometimes may be offensive. The Los Angeles Unified School District does not condone the use of such materials.

LAUSDnet acceptable use policy rules and regulations:

- The Internet account is free to users.
- It is a privilege to receive an Internet address.
- A RESPONSIBLE user of the Internet may keep an LAUSDnet account as long as the user is a staff member or student in the Los Angeles Unified School District.

A responsible user may:

- Use the Internet to research assigned classroom projects.
- Use the Internet to send electronic mail (e-mail) to other users.
- Use the Internet to explore other computer systems.

A responsible user:

- May NOT use the Internet for any illegal purpose.
- May NOT use impolite or abusive language.

- May NOT violate the rules of common sense or etiquette.
- May NOT change computer files that do not belong to the user.
- May NOT send or receive copyrighted material without permission.
- May NOT share his or her password with anyone.

Note that LAUSDnet system operators will have access to all user accounts, including e-mail.

By signing on to LAUSDnet you acknowledge that you:

- Understand the rules and regulations of the LAUSDnet Acceptable Use Policy.
- Realize that, if the rules are violated, your LAUSDnet account will be canceled.
- Understand there will be no second chances.

Teacher AUP MAY 1995

## STUDENT SIGNATURE AND PARENTAL CONSENT FORM

LAUSDnet (Internet) Account

(Note: If a student is too young to read the Acceptable Use Policy, please provide assistance. The purpose of the Acceptable Use Policy is to provide information, not to exclude anyone.)

Student last name Student first name

School name

Teacher name

/ /

Date student completed Internet Test

I have read the Acceptable Use Policy. I have completed the Student Internet Test. If I follow the rules I may keep my account on LAUSDnet. If I do not follow the rules in the Acceptable Use Policy, I understand that my network account will be taken away from me. I understand that there will be no second chances.

Student Signature Date

## PARENTAL CONSENT

I have read the LAUSDnet Acceptable Use Policy and the LAUSDnet Student Internet Test. I understand that the Internet is a worldwide group of hundreds of thousands of computer networks. I know that the Los Angeles Unified School District does not control the content of these Internet networks. When using the Internet, I realize that students may read material that I might consider controversial or offensive. The Los Angeles Unified School District has my permission to give an Internet account to my child. I understand that my child may keep this address as long as procedures described in the Acceptable Use Policy are followed.

Parent or guardian signature Date of signature

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### Los Angeles Unified School District
### Student Internet Test

(Note: If a student is unable to read the Internet Test, a teacher may assist by reading the questions and marking the answers. This "test" is a tool to teach Internet etiquette, NOT a test to exclude anyone. If a student does not pass the test, the issues should be discussed and the test given again.)

True or False (Circle the correct answer)

1. A student or teacher may not use the Internet to sell anything. True or False
2. The Internet is made up of many computer networks. T or F
3. It is OK to share your password with friends. T or F
4. Copyrighted material may be software, books, or files written by others. T or F
5. I can swear or verbally abuse anyone using e-mail if I don't know the person I am writing to. T or F
6. "Download" means: receive a file from another computer. T or F
7. I should delete files, including old e-mail messages, from my account to save space on the computer. T or F

Multiple Choice: (Circle the correct answers)

8. If you think that someone is using your password,
   a) change your password
   b) notify the teacher or network administrator
   c) don't worry about it
   d) a and b
9. When using e-mail, you
   a) may send letters to anyone and say anything
   b) may send e-mail for fun to anyone
   c) never know who is reading your mail
   d) must remember Acceptable Use Policy
   e) c and d
10. If you need help,
   a) ask the network operator or your teacher
   b) look for help on the Internet
   c) experiment
   d) all of the above
   e) none of the above
11. A computer "virus" is a problem. You should
   a) check your disks for viruses
   b) scan downloaded files for viruses
   c) not worry about viruses because there are none on the Internet
   d) not worry because the District will take care of it
   e) a and b

# JCPS-NET USE PROCEDURE

Net technologies are shifting the ways that information may be accessed, communicated, and transferred. Those changes may also alter instruction and student learning. Jefferson County Public Schools (JCPS) offers students access to the electronic information highway and the Internet. We call this service JCPS-Net.

Along with access to computers and people all over the world comes the availability of materials that may not be considered appropriate in the classroom. However, on a global network it is impossible to control all materials. Ultimately, the school staff, parents, and guardians of minors are responsible for setting and conveying the standards that students should follow when using media and information sources. JCPS supports and respects each family's right to decide whether or not to allow their child to apply for access to JCPS-Net.

## JCPS-Net Use Rules and Responsibilities

Students are responsible for good behavior on school computer networks just as they are in a classroom or school hallway. Communications on the network are often public in nature. General school rules for behavior and communications apply.

JCPS-Net is providing for students to conduct research and communicate with others in relation to school work. Access to network services is given to students who agree to act in a considerate and responsible manner. Parent permission is required. *Access is a privilege, not a right.* Therefore, based upon the acceptable use guidelines outlined in this document, the system administrators will deem what is inappropriate use and their decisions are final. The system administrators may close an account at any time. The administration, faculty, and staff of JCPS may deny, revoke, or suspend specific user accounts.

Individual users of the JCPS-Net are responsible for their use of the network. The use of their account must be in support of education and research and must be consistent with academic expectations of JCPS. Use of other organizations' networks or computing resources must comply with the rules appropriate for that network. Transmission of any material in violation of U.S. or State regulations including copyrighted, threatening, or obscene materials is prohibited. Use for commercial activities by for-profit organizations, product promotion, political lobbying, or illegal activities is strictly prohibited.

The user is expected to abide by the following network rules of etiquette:

- Be polite. Do not write or send abusive messages.
- Use appropriate language. Do not swear, use vulgarities, or any other inappropriate language.
- Transmission of obscene materials is prohibited. Sending or receiving offensive messages or pictures from any source will result in immediate suspension of privileges.
- Do not reveal the personal address or phone number of yourself or other students.
- Do not communicate any credit card number, bank account number, or any other financial information.
- Electronic mail is not guaranteed to be private. People who operate the system do have access to all mail. Inappropriate messages can result in suspension of privileges.

- Do not use the network in such a way that would disrupt the use of the network by other users.
- Vandalism—any malicious attempt to harm or destroy data of another user—will not be tolerated.
- Any questionable action will result in the cancellation of user privileges.

Violation of any of the above mentioned rules and responsibilities will result in a loss of access and may result in other disciplinary or legal actions.

## JCPS-Net User Agreement and Parent Permission Form

After reading the JCPS-Net Use Rules and Responsibilities, please complete this form to indicate that you agree with the terms and conditions outlined. The signatures of both the student and parent/guardian are mandatory before access may be granted to JCPS-Net. This document, which incorporates the JCPS-Net Use Procedure, reflects the entire agreement and understanding of all parties.

As a user of the Jefferson County Public School District computer network, I have read and hereby agree to comply with the JCPS-Net Use Procedure.

Student Signature: ____________________ Date: __________

Student Name (Please Print): ______________

Student's School: ______________

Grade: ___________ Date of Birth: ___________

As parent/legal guardian of the student signing above, I grant permission for my child to access networked computer services such as electronic mail and Internet. I have read and agree to the JCPS-Net Use Procedure, and I understand that I may be held responsible for violations by my child. I understand that some materials on the Internet may be objectionable; therefore I agree to accept responsibility for guiding my child, and conveying to her/him appropriate standards for selecting, sharing and/or exploring information and media.

Parent/Guardian Signature: _______________ Date: ________

Parent/Guardian Name (Please Print): ________________

Street Address: ________________

Home Telephone: __________ Daytime Telephone: ________

Complete and return to your child's school.

Equal Opportunity/Affirmative Action Employer Offering Equal Educational Opportunities

# JCPS-NET STAFF USER AGREEMENT FORM

After reading the JCPS-Net Use Rules and Responsibilities, please complete this form to indicate that you agree with the terms and conditions outlined. Your signature is required before access may be granted to JCPS-Net. This document, which incorporates the JCPS-Net Use Procedure, reflects the entire agreement and understanding of all parties.

As an employee of the Jefferson County Public School District and a user of the computer network, I have read and hereby agree to comply with the JCPS-Net Use Rules and Responsibilities.

Signature: ______________________ Date: ___________________

Full Name (Please Print): ____________________________________

Work Location: ____________________________________________

Job Title: _______________ Date of Birth: ___________________

Home Address: ____________________________________________

Home Telephone: ______________ Daytime Telephone: __________

Complete and return to your supervisor.

# Endnotes

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supported by the National Telecommunications and Information Administration.

16. U.S. Department of Commerce, *National Telecommunications and Information Administration, Connecting the Nation: Classrooms, Libraries, and Health Care Organizations in the Information Age*, June 1995, p. 25. This project is supported by private sector firms and a grant from the Telecommunications Information Infrastructure Assistance Program (TIIAP) of the U.S. Department of Commerce.

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What is the United States Advisory Council on the National Information Infrastructure?

The United States Advisory Council on the National Information Infrastructure was created by executive order at the end of 1993 by President Clinton. The 36-member advisory panel was formally established and appointed by the Secretary of Commerce Ron Brown in early 1994.

Through its diverse membership, the Advisory Council represents many of the key constituencies with a stake in the National Information Infrastructure (NII), including private industry; State and local governments, community, public interest, education, and labor groups; creators and distributors of content; privacy and security advocates; and learning experts in NII-related fields.

The Advisory Council is co-chaired by Delano E. Lewis, President and Chief Executive Officer of National Public Radio, and Edward R. McCracken, Chairman and Chief Executive Officer of Silicon Graphics. The Council has the responsibility of advising the Secretary of Commerce, and the Administration, on a national strategy for promoting the development of the NII and the Global Information Infrastructure.

The Advisory Council has specifically focused on: defining the roles of the public and private sector; maintaining the balance of protection of intellectual property rights of creators and copyright owners with the needs of users; generating national strategies for developing applications in electronic commerce, education and lifelong learning, health care, government information and services, and public safety; conceiving approaches to maximize interconnections and interoperability of networks; and addressing the important issues of privacy and security.

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## A GUIDE TO GETTING THERE.
## WHAT THIS PUBLICATION CONTAINS

- Shows that the private sector can and should help bring the Information Superhighway's benefits to all K-12 students and adults;
- Describes real benefits for real people from the Superhighway;
- Proposes opportunities for all students and adults to use the Superhighway through schools, libraries, and community centers;
- Identifies leadership at the community level as the essential ingredient in bringing the Information Superhighway to students and adults, and suggests ways to galvanize leadership;
- Offers community leaders examples in success stories of how to launch KickStart Initiatives, but doesn't mandate a "one-size-fits-all-communities" process;
- Emphasizes the importance of making major advances in educational content for the Superhighway, not just supplying computers and wiring schools;
- Suggests substantially increased and continuing training for teachers, administrators, librarians, and community-center personnel;
- Recommends reasonable and responsible "rules of the road" that will help protect intellectual property, privacy, and security.

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